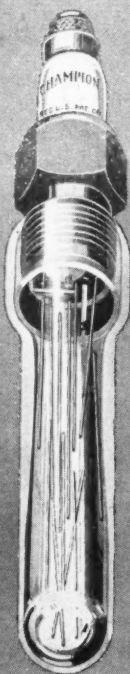


MOTOR AGE

Vol. XXXIII
No. 6

CHICAGO, FEBRUARY 7, 1918

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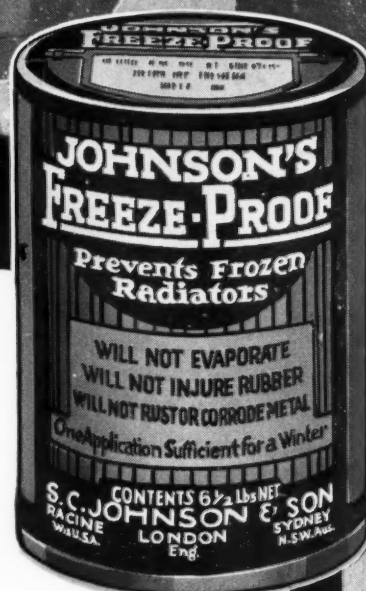


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MOTOR AGE

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NEXT WEEK

As MOTOR AGE goes to press it is with a special dispatch from the Twin Cities to the effect that the exhibition there is larger than New York and Chicago together. While it is impossible to carry a complete account of the automotive show at the Twin Cities in this issue, this will be among the features of MOTOR AGE for next week. Look for it and read it.

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MOTOR AGE

Tank and Tractor

One Broke the German Line at Cambrai and the Other
Helps Feed Soldiers—American Engines in
Aviation, Ordnance and Agriculture

U. S. Tanks En Route

*Eye-openers at the War Dinner in Chicago Feb. 1 by
Major W. G. Wall and
C. F. Kettering*

If our factories live up to schedule, we will have more tanks by the end of the year than England and France have built since the beginning of the war.

We now are sending overseas airplanes which to-day are better than any which ever have flown before.

There is not another engine in the world which is able to develop 400 hp. and yet weigh only 875 lb. (as our Liberty aviation engine does).

Within the sixty days shipments of trucks and trailers to the ordnance department of our armies in the field will reach a steady flow of about 2000 a week.

Nearly 9000 tractors of the caterpillar type are in the course of construction at several different factories. These range from 30 to 120 hp. They have been developed to such an extent that there is very little they will not do in the way of surmounting obstacles, steep grades and heavy going. This is due in part to their being of the articulated, track-laying type.

Caterpillars weighing nearly 18 tons exert no more pressure on the ground per square inch than does a man's foot in walking.

HAD \$500,000 a year been spent for the last few years in experimenting with fuels in a well directed way, there would have been no fuel problem to-day—motor cars saved Paris, saved Verdun and tanks cut through the German lines at Cambrai. The horse is the most inefficient source of power we have.

These three disconnected statements are used to open this article because they each epitomize in a sentence one of the vital questions of direct interest to motorists which formed a subject of consideration by those practical dreamers of motordom, the automotive engineers. The average motorist, if he thinks of the Society of Automotive Engineers at all, thinks of it as a body of designers whose deliberations are confined to abstruse discussions of proper analysis of steels or the size of a keyway. But it is to this society and to the men who comprise it that credit must be given for most of the achievements of motor cars, planes and tanks in the present war and, what is still less widely known, the production of the U-boat chasers, which have been chiefly instrumental in suppressing the submarine menace also is their work.

Tractors Concern All

All of us who look to the farm as the original source of our food supplies—and that includes all of us—are concerned intimately with the phase of that work of the society which formed the chief subject of the meeting of the engineers at Chicago Friday. With our Government and its people looking to the farms of America to supply not only ourselves, our boys at the front, but our allies with foodstuffs, every effort must be made to make the production from each acre as great as possible.

To assist in this was the reason for the Chicago meeting of the engineers, who confined their whole attention during the day to the problem of agricultural tractors. Not 5 per cent of the demand for tractors has been filled, which means that not 5 per cent of the farms where tractors would

The Tractor and Farm

*High Spots from the Tractor Meeting in Chicago Feb. 1
by the Various Speakers
of the Day*

The average tractor needs more traction to the amount of power furnished.

It takes practically the same power to pull two plows at 3 m.p.h. as it does to pull three plows 2 m.p.h.

The more plows to distribute the weight over, the less the weight for each plow. It takes an initial weight of 1500 to 2000 lbs. to pull one 14-in. plow and 500 to 1000 lbs. more to pull two plows and 300 to 700 lbs. to pull the third plow.

The ideal tractor engine is a four-cylinder with certain elements which from past experiences have proved their worth.

The modern gasoline tractor is short-lived because it is built to a cost price.

Real tractor service begins in the engineering department.

Untried devices have no place on tractors at this critical period in the history of our country.

It is absolutely essential to stick to the truth—if a tractor has certain limitations, the farmer should be told of these; otherwise, he is sure to attempt the 35-hp. job with a 15-hp. tractor, with disastrous results.

work an improvement are working at greatest efficiency. The tractor is in its infancy and we know so little of the tractor and so little of the problem which confronts the manufacturer and the user of tractors that the value of the meeting was doubly great in that its whole idea was to outline the future development as the industry shapes itself and becomes more mature.

The president of the Society, C. F. Kettering, sensed the opinion of those who studied the problem in that the tractor question, as it stands to-day, is only 50 per cent engineering, the other 50 per cent being psychology. Unless the tractor company studies the psychology of the farmer along with the engineering problems of the tractor itself, it will fail.

The questions taken up by the engineers were of most practical interest to prospective tractor users. The four angles considered were tractor service, tractor design, tractor engine and tractor transmission.

8000 Cannon by Next Fall!

War Work of U. S. Told at War Dinner

CHICAGO, Feb. 2—The engineers, representing the automotive industries of the nation, outlined their activities in connection with the war at a War Dinner of the Society of Automotive Engineers, held at the New Morrison hotel, last evening. It was an event of supreme import, being attended by more than 1200 persons, and is to be recorded as one of the most impressive affairs in the history of the society.

The reading of a letter of greeting from President Wilson by H. L. Horning opened the meeting. The speakers of the evening were General Kennon, commandant of Camp Grant; C. F. Kettering, president of the S. A. E.; Major W. G. Wall of the Ordnance Department; and Major Eichenfelder of the French army. W. H. Van Dervoort acted as toastmaster. Following the reading of the letter from President Wilson, H. L. Horning introduced General Kennon who spoke in brief regarding the materials necessary to win the war. The substance of his talk was that while munitions and food are vital necessities, men are the chief asset upon which we must rely for the final victory.

President Outlined Work

The principal speaker of the evening was President Kettering, who outlined the work that the Society had and is doing to aid the Government toward successful conclusion of the war. He outlined, in brief, the work of the afternoon session at which the tractor had been the chief topic, pointing out that we have in the past progressed through an age of stone and an age of iron, and we are at the present time, and probably will be for the next 700 years, passing through an agricultural age. He called attention to what an inefficient animal the horse is when considered from a power standpoint.

"There is to-day 25,000,000 hp. available from horses," said Mr. Kettering, "and it requires the product of 125,000,000 acres to feed the horses necessary to develop this amount of power. We could se-

It was at the war dinner in the evening that the other phases of the motor's relation to the war were presented so interestingly. Aside from the important statements which head this article and which gave some new facts as to what the American motor industry is doing in the production of airplanes, tanks and ordnance tractors, the fuel question was presented in a new light by President Kettering.

"Of all the problems with which we have to contend to-day," said Kettering, "the fuel problem is the biggest. There is nothing moved on this earth except by the sun's energy. This has been stored up in all forms in the earth, and we have used it lavishly. Have we overdrawn our account? To-day, there is arising a question. Can we go ahead? Must we curtail? It is the greatest question which confronts us and yet we are not giving it proper consideration. We must be so organized that we can run this winter on last winter's sunshine."

cure far better results from the land by raising a vegetable from which we could secure alcohol to be used as a fuel. However, the Government limits this by imposing a tax of \$1 a gallon on this fuel for the fear that some poor degenerate persons may drink themselves to death.

"The fuel question to-day is one of the biggest problems with which we have to contend. All forms of energy in their final analysis originate from the energy given out by the sun. This has been stored up in the earth in various forms of liquid and solid fuels and might be compared to our bank account. It is needless to say that we have drawn rather lavishly upon this bank account and are now almost to the point to where we have overdrawn. The great question is, can we go ahead or must we curtail? Will it be necessary for us to be so organized that we can run this winter on last summer's sunshine?"

"The country's greatest asset is its ability to turn out quality products in quantity production. This is the one fact which is going to be of greatest importance to us in winning the war. And yet the limitations imposed upon us by the Government in some instances makes it exceedingly difficult to secure satisfactory results. I have seen bayonets rejected because they were .003 in. too narrow in the blade. The function of a bayonet does not require such accuracy and is a needless restriction upon manufacture. Truck wheels also have been rejected because their hub holes were .0005 in. too large. The one message which we should try to convey to the Government is to study the actual conditions under which the product must operate, and then let those who are familiar with its manufacture determine the limits which would be most suitable for it from a production and service standpoint.

"At this time all criticism should be of a constructive nature. For instance, it has been said that the Liberty aircraft engine is the heaviest engine ever built for similar uses. Yes, this is true, but at the same

time it must be considered that this engine develops more power than any airplane engine heretofore constructed in this country. In fact, there is not another engine in the world that is able to develop 400 hp. and yet weigh only 875 lb. About one year ago the maximum demand for airplanes was at the rate of about 150 a year, and with this small production it was not a difficult matter to secure the material necessary. Now that we are constructing airplanes in great quantities the material situation becomes more pressing, and yet we are sending overseas airplanes which, today, are better than any that have ever flown."

Should Be Proud

W. H. Van Dervoort during his talk told of the great work the S. A. E. and its members are doing for the Government and that the organization should be proud of such men as Howard Coffin, W. G. Wall, Howard Marmon and many others who are devoting their time to this work. He spoke rather bitterly against not permitting the country to prepare during the three years that the other nations were at war and referred to this lack of preparation as the greatest of criminal errors.

Major Wall spoke of the great task that confronted the Ordnance Department, due chiefly to the fact that the appropriations for the last few years had been entirely inadequate, and found this department in a very unprepared state at the beginning of war. It has proved a gigantic engineering problem to provide munitions for 3,000,000 men in eighteen months. The greatest of these are the manufacture of the big guns, on account of the time which it necessarily takes to complete one.

It was said that by next fall we will have more than 8000 cannon and many thousands of the Enfield and Springfield rifles. For the motorized batteries this department has ten large factories, making the four-wheel-drive units which are to be fitted to various types of bodies to suit the particular duty which they may have to perform. These units are to be relied upon for mobile repair shops, gasoline supply trucks, mounting for anti-aircraft guns, etc. In addition to these there are 9000 caterpillar tractors in construction and a great number of trailers. If expectations are fulfilled by the end of the year we will have more tanks than England and France combined.

What Major Wall Said

Extracts from Major Wall's paper follow:

When war was declared it was decided to motorize certain of the gun batteries. Later this decision was extended to cover all but one size of gun and now part of these are motorized. By motorizing a battery is meant replacing the horses with tractors or trucks. It was found advisable to do this on account of the necessity of rapid transit and on account of the caliber of the guns used for field service having been greatly increased—guns had become too heavy for horses to draw.

This motorization introduced a large number of new problems which had to be dealt with, most of which have now been solved satisfactorily. On account of the work the ordnance truck had to do—towing guns and hauling ammunition up to the front lines—sometimes over almost impassable terrain, it was found necessary to use a type of truck driving on all four wheels, so two makes were adopted—one a 2-ton and the other a 3-ton, which then were being produced by their respective factories, as it was thought to be poor policy on account of the limited

time available to stop and design a standard four-wheel-drive truck which might have been better but would have taken more time to produce and would not have been tried out like these two existing makes, both of them having been tried out and used on the border the previous year.

Ten Plants at Work

These two makes of chassis, with the addition of one size of lighter truck, now are being produced by ten large factories with the assistance of about 300 other factories making bodies and parts for them. These chassis are equipped with different kinds of bodies, most of them with an all-steel ammunition body which is of the proper size to pack in their original packing boxes ten different sizes of ammunition ranging from 1,000,000 rounds of rifle cartridges to five rounds of our large 9.5 howitzer shells. In this large size the powder and shells are separate. About 1000 of these chassis are being equipped with machine shop bodies, regular traveling machine shops with lathes, drills, presses, grinders, electric drills and other tools for repairing guns in the field, besides an engine and generator for generating electricity. A large number are furnished with equipment repair bodies for repairing harness, clothing, machine guns, small arms, etc., and have sewing machines and other tools on them for doing the work. Also some are provided with power winches.

Several other types of bodies also are mounted on these chassis for such uses as apparatus for fire control, gasoline tanks, telephones, artillery supply, machine guns and reconnaissance. Some trucks have the guns for anti-aircraft work mounted on them so that they can shoot at most any angle and make a quick run to any place where required.

A number of different trailers have been designed to be hauled behind trucks, some carrying anti-aircraft guns, others carrying field guns and some large 10-ton trailers which are used to transport the tractors or tanks rapidly from one place to another. Some of these also are equipped with heavy cranes for mounting guns or lifting wrecked vehicles.

As the mobility of an army depends greatly on the conditions of the roads, it is necessary to see that these roads are kept in good condition. The tractors were cutting up the roads but have now been changed to smooth tread and removable grouters and for long distances these heavy trailers are used to carry them.

There is a mobile repair shop consisting of twelve trucks, three machine shops, three equipment repair trucks and six trucks for supplies with each division. These work right up near the front.

For every six divisions constituting an army corps there is a corps repair shop with large machine tools on trailers, each trailer having one large tool on it like a lathe or a drill press and one with a large, stationary engine and generator; these are semi-permanent but can follow the army and will be of great value if our army ever does advance rapidly into Germany, which we trust to believe it will.

There have been a number of other types of vehicles designed, each one for its especial use.

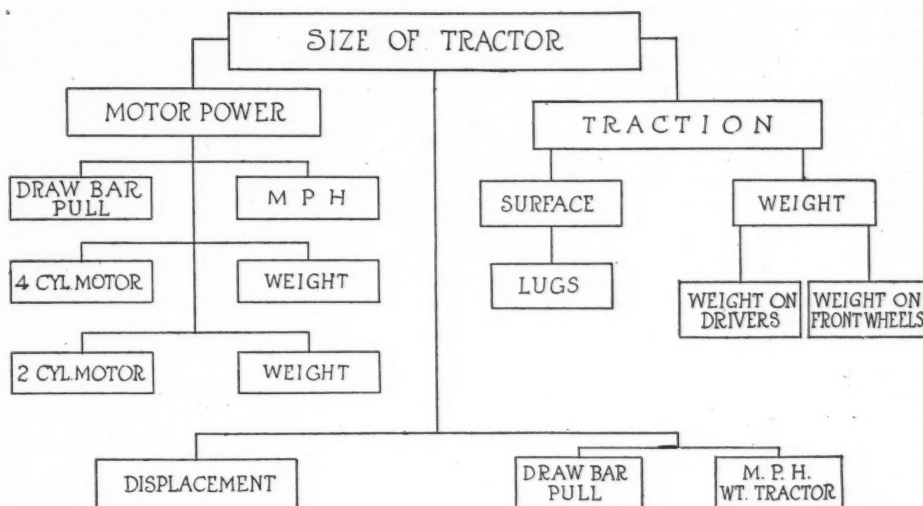
Base Repairs Shops in France

Large permanent base repair shops have been established in France which cover more than 2 square miles of ground and these shops are equipped to repair the heaviest artillery, besides trucks, tractors, etc.

The factories working on these trucks and trailers have been making some shipments for the last five months, and it is expected that within the next sixty days that this quantity will reach a steady flow of about 2000 a week to our armies in the field.

Military tractors of the caterpillar type have been developed, and nearly 9000 are in course of construction at several different factories. These are of different sizes ranging from 120 hp. to those with only about 30 hp. They are used for pulling the heavy guns and have been developed to such an extent that there is very little they will not do in the way of surmounting obstacles, steep grades and heavy going. This is due in part to their being of the articulated caterpillar, or track-laying type, and though they weigh, in the larger sizes, nearly 18 tons, the pressure per square inch on the ground is only about that of a man's foot when walking, so they do not sink in like a truck or other wheeled vehicles. Some of these tractors are being armored to protect the engine and machinery.

I wish it were permissible for me to tell you something about the tanks which have been designed and which are being constructed. I can say, however, that if our expectations are fulfilled by the factories making them living up to their schedule, we will have more tanks by the end of this year than England and France have built since the beginning of the war.



Elements in the make-up of a tractor which should balance, as considered in G. T. Strite paper

Psychology Plus Engineering Threshing Out the Tractor Question

CHICAGO, Feb. 1.—The American tractor manufacturer must put 50 per cent psychology and 50 per cent engineering into his product to meet conditions; at present there is too much invention going on and too little real machine work; standardization is desirable, but the tractor is still too embryonic to attempt this; the modern gasoline tractor is short-lived because it is built to a cost price; not 5 per cent of the demand for tractors has been filled—these were outstanding features of the four papers presented to the tractor men today.

Not since the Society of Automotive Engineers decided to include all automotive products in its transactions has the tractor subject been more thoroughly dealt with. At the conclusion of the meeting it was the feeling of those present that real progress had been made. An outline of a future program had been sketched. The feeling was common among the engineers that too little is known about the tractor at present and the meeting was, therefore, made up to some extent of generalities.

"Tractor Service" was the subject of the first paper, presented by George Cormack, Appleton Mfg. Co., Batavia, Ill. The author made a strong plea for service to the farmer from the standpoint of an idealist. "Fundamentals of Tractor Design" was the subject of a paper by George T. Strite, Minneapolis, Minn. Harry C. Buffington, Minneapolis Steel & Machinery Co., Minneapolis, Minn., in his paper on "Tractor Engine Design" suggested various ways in which this unit might be improved, while the fourth paper, by E. R. Greer, Emerson-Brantingham Co., Minneapolis, Minn., on "Tractor Transmissions," pointed out vital facts on this subject.

Although the session was full of generalities, some specific facts were driven home. Mr. Cormack stated that tractor manufacturers must take into consideration the neglect by the average American farmer of farm machinery and build tractors accordingly. If the farmer is told that he must turn this or that grease cup so many times a day or put a drop of oil in this hole

every 2 hr., he is sure to ignore instructions until the mechanism stops for want of oil. It is, therefore, up to the manufacturer to build his product with the minimum number of parts requiring attention or adjustments.

Real tractor service begins in the engineering department. Designers must simplify constructions; too little attention is paid to accessibility of parts. There is a tendency for makers to depart from standard engineering practice in many instances and there are all sorts of contrivances and devices by which one maker attempts to outdo his rivals, it was stated. This is a road leading to nowhere. Co-ordination will be attained only when all tractor manufacturers pull together and work along the same general lines as the motor car makers are doing. For instance, every make of motor car has details of construction characteristic to it and found in no other car, yet all cars look very much the same and are built along the same general lines. Untried devices have no place on tractors at this critical period in the history of our country, when the tractor is looked upon as necessary to maintain the production of foodstuffs. Due to the shortage of labor in agricultural regions, the tractor must be built in quantities along sane lines and of best material possible.

Service as a Duty

It is a patriotic and businesslike duty not only to build service into the tractor but to render it to the farmer after he has bought the machine and attempts to use it. It is little short of crime to incorporate steels into a badly designed tractor that is short-lived when such metal could have been far more profitably used in war appliances. On the other hand, the tractor maker may deliver to the farmer a piece of machinery which he knows will stand up under service but fails to send a capable instructor along to impress upon the user how necessary it is to keep the parts oiled. The life of the tractor depends upon the care it receives. Unfortunately, it happens that the salesman who sells the tractor is

also the instructor in many cases and quite superficial in giving out information. So long as he has sold the tractor, he cares little for its maintenance.

No Two Handle Alike

It is conceded generally that for best results one man should handle the tractor and be responsible for its upkeep. Tractors are like motor cars in one respect. No two of the same make handle alike. Each one has its peculiarities and if one man is kept on the job, he will in time find out these characteristics and be better fitted to run the machine than a green farm hand.

A point brought out in Mr. Cormack's paper was that the tools furnished with most tractors are totally unfit for use after a short period. The steel used in the wrenches is too soft and the openings in the jaws soon become rounded off, making them useless. This is detrimental to the life of a tractor, for it has the effect of causing the farmer to delay making necessary adjustments.

A deplorable fact is that so many tractor salesmen are too optimistic in selling their wares. They tell a farmer that he can do the work of a 35 hp. machine when the one he is selling is capable of only 15 hp. It is absolutely essential to stick to the truth, and if a tractor has certain limitations, the farmer should be told of these. Otherwise he is sure to attempt the 35-hp. job with a 15-hp. tractor, with disastrous results.

Interchangeability of parts will be a step in the right direction, but the time is not ripe for fulfillment until tractors are constructed along more general lines. That it is advisable, highly necessary and bound to come is conceded quite generally.

In his paper on fundamentals of tractor design, Mr. Strite pointed out that tractors should not be designed to do tricks, as is unfortunately the case in some instances. Also tractors should be built to meet average conditions. Texas and Montana conditions which are extremely difficult to cope with, do not represent average conditions. His paper in brief follows:

Power and Traction

One of the hardest things in the tractor business is to have the nerve to stand pat and build one size and not keep constantly increasing the size so that it will do a little more work. The second step after the size has been determined, we have two factors to deal with, the amount of power and traction. Here again is a hard question to decide, whether or not to have sufficient power so that the engine will not die but continually turn the wheels regardless of the kind of ground or footing, or to put in an engine with sufficient power to carry the load and turn the wheels. If you put in 5 or 10 hp. more than would be required for ordinary work, then the entire transmission and tractor must have sufficient strength to take care of the load and turn the wheels under extreme and abnormal conditions.

What the average wheel tractor needs, as a general rule, is more traction to the amount of power generally furnished. The farmer would then get a more efficient and better balanced machine, one that could be used in extreme conditions, on wet, soft or sandy ground.

In the old days we built tractors which were exceedingly long in weight and rather shy in surface. The future tractor and even the tractor of today is being built with less weight by multiple-cylinder engines and high grade material and more surface on the ground. The surface also must be backed up by the proper shape and style of grouters or lugs.

After the total weight of the tractor is determined, the question of distribution of total weight comes in. If it is a four-wheel machine with two drivers in the rear and two front wheels, then careful judgment must be used as to how much weight should be placed on the drive wheels and how much on the two front wheels. The best practice

today seems to be about 70 per cent of the total weight on the rear drive wheels and about 30 per cent on the front wheels. This weight must be calculated with the tractor standing still, without any drawbar load.

The question of the power in the engine of the tractor is based upon, first, the drawbar pull, which, however, does not mean anything, unless the speed or miles per hour are taken into consideration. It takes practically the same power to pull two plows at 3 m.p.h. as it does to pull three plows 2 m.p.h. This is a point where the farmer has been greatly deceived. Some companies have sold their tractors on drawbar pull in pounds, saying nothing about the miles per hour, while other companies made a strong point of the miles per hour. In connection with the drawbar pull, both must be considered to determine the drawbar horsepower.

Both the four-cylinder and the two-cylinder late-type tractor show a wonderful development, especially so in regard to the weight per plow and per horsepower. There is every reason why the large tractor should be less weight for each plow and less weight per 100 lb. of drawbar pull than the small tractor. The reason for this is the initial

Said by the Tractor Speakers at Chicago

The American tractor manufacturer must put 50 per cent psychology and 50 per cent engineering into his product to meet conditions.

There is too much invention going on and too little real machine work.

From now on the tractor game is going to advance either by the survival of the fittest, and the natural evolution of the right tractors succeeding and the wrong gradually dying out, or by getting in the right track or the tractor engineers and manufacturers getting together and through standardization avoiding a lot of wrecks and failures, which must come sooner or later.

The Government should design and build a Liberty tractor to be manufactured by the Government during the war and to be open to any company to make or to adopt any part they might see fit after the war.

It is a patriotic and businesslike duty not only to build service into the tractor but to render it to the farmer after he has bought the machine and attempt to use it.

Tractor should not be designed to do tricks.

weight of the tractor itself and running itself over the ground. In a one- or two-plow tractor this weight is very heavy, as it is distributed over one or two plows only. The more plows we have to distribute this weight over, the less the weight for each plow.

For instance, it takes an initial weight of 1500 to 2000 lb. to pull one 14-in. plow and 500 to 1000 lb. more to pull two plows and 300 to 700 lb. to pull the third plow. This also affects the power or displacement in the same way, as it takes a certain displacement for the machine itself. Some tractors are over-rated in drawbar horsepower and drawbar pull, while others rated very conservatively. As a rule the four-cylinder machine shows a higher state of development than the two-cylinder machine.

There is a question as to how far we can go in reducing the weight per 100 lb. of drawbar pull for practical everyday use on the average conditions of soil. I can see how we eventually can build tractors so that they will pull more than their weight, providing the speed is not too great.

The tractor engineers have been criticised severely in some cases for the past and present state of the tractor, with its various

different designs. However, it must be remembered that by different types and different designs we will find the survival of the fittest. From now on, the tractor game is going to advance either by the survival of the fittest and the natural evolution of the right tractors succeeding and the wrong gradually dying out, or by getting in the right track, or, the tractor engineers and manufacturers getting together and through standardization avoiding a lot of wrecks and failures.

Lubrication of Tractor

Lubricating the tractor engine is the hardest problem in engine design at the present time and will continue to be such until a better method of using kerosene as a fuel is produced. This was one of the facts emphasized by Mr. Buffington in his paper on the fundamentals of tractor engine design. His talk, augmented by lantern slides, was in part as follows:

The tractor manufacturers of today have the greatest opportunity that any manufacturing industry has ever had in the history of the world. They have an opportunity of carrying standardization further and more successfully and with the least resistance, if they will get together, work together and through the Society of Automotive Engineers assist in putting through the standards which are necessary.

It has been said that the eastern motor car manufacturers are going to try to get into tractor manufacturing. They are going to get in, although they probably will spend fortunes to learn just what many of us have learned. The motor car manufacturer has four great advantages over the tractor manufacturer.

First, he has the money and is looked up to by the investor as a successful business man.

Second, he knows how to get production. He has the organization and equipment to get production.

Third, by past experience in the motor car, he knows the value of standardization and will help standardize the parts of tractors.

Fourth, he has learned to cut out petty jealousy and petty ideas and look at average results. One of the greatest troubles in the tractor business today is jealousy, or beating the other fellow and petty ideas, some of whom stick to these ideas until their company is bankrupt.

Considering the state of the tractor industry at this time, and the inability of the companies to produce tractors fast enough and the quality of tractors that are being turned out, I believe that the Government should at this time, design and build a Liberty tractor to be manufactured by the Government during the war and to be open to any company to make or to adopt any part they might see fit after the war. The corps of engineers who design and build this machine should have instructions that they will do no experimenting but work on the lines of the best we have in the tractor as it is today. This move would do more to bring about standardization and the final eventual tractor than any other move that could possibly be made. The war has already brought about the necessity and advantages of standardization in other machines, why not the tractor?

The Ideal Engine

The ideal tractor engine is a four-cylinder with certain elements of construction which from past experience have proved their worth. There are several reasons why the removable cylinder head should be classed as essential for the tractor engine. One of these is that the compression can be varied for altitude. The cylinder head should part on a line with, or a little below the top of the piston and not above. The latter method makes it hard to clean the carbon off the pistons.

The crankshaft, being the essential element around which the engine is constructed, deserves first consideration as to design. Personally the writer prefers the three-bearing shaft. There are, however, some points in favor of the two-bearing type, in that the two center cylinders can be placed closer together and, of course, doing away with one bearing is an advantage, but on the other hand, a very heavy shaft is necessary and generally speaking the three-bearing type is best suited for large engines.

Liberal water space around the head should be given very close attention as unlike the motor car engine, a maximum load must be expected for a period of hours. An even thickness of combustion chamber walls is very essential for the same reason, and means for checking up the thickness should be considered very seriously.

Theoretically a tractor engine should not be pulled down below normal speed, but this often is done and in fact at least 50 per cent of the time the operator will have his engine

Automotive Engineers and Guests at War Dinner



—Photo by Kaufmann & Fabry Co.

General view of the S. A. E. war dinner held at the Hotel Morrison in Chicago, Feb. 1, which was attended by more than 1200 persons

overloaded and it is for this reason that the stroke should be at least 1.4 the cylinder bore. The long stroke engine is also very desirable, as the difference between the engine speed and final drive is not so great and is more convenient in holding down the transmission gear diameter.

The speed control on the engine should be about 10 per cent above normal.

Engine rating on kerosene should be based on 800 ft. piston speed, and this rating should not be over 75 per cent of its maximum capacity in gasoline. Actual laboratory tests have shown the power output on kerosene to be within 8 per cent of that on gasoline, but under actual working conditions it is not practical to expect this.

A tractor engine before leaving the test block should not use more than 1 pint of kerosene per horsepower hour when pulling its rated load. This fuel is to have a gravity not lower than 42 deg. Baume, and an open flash point of not over 120 deg. Fahr.

One reason why it is difficult successfully to run tractors on kerosene in the country is on account of the grade of kerosene used in small towns. This kerosene might be termed lamp oil and although the specific gravity is not so low the open flash point is very high and to use it in engines, it is necessary, in order to vaporize it, to heat it to a very high temperature. This high temperature, of course, reduces the power. This fuel gives a very good light and there is no danger from explosions, but it costs more than the so-called distillate, which in most cases is an excellent fuel.

Magneto Troubles

Spark plug location without a doubt will cure 50 per cent of the magneto troubles, and yet engines are designed without attempting to determine the proper location of the plug. Without hesitation the designer will place it over the intake valve on an L-head engine or on the intake side of the valve-in-the-head type. Spark plugs should not be placed near the line of cylinder bore where oil from the piston will splash on the plug, or placed in line with the intake gases when using kerosene as fuel. A careless operator either will use too much fuel or too much water with the fuel and with the plug directly in the path of the gas flow, this will cause improper ignition.

Lubricating the tractor engine is the hardest problem in engine design at the present time, and it will continue to be so until a better method of using kerosene as fuel is employed. A most excellent oiling system has been developed for the motor car. In fact, it is as near perfect as anything could be produced, but has turned out to be a miserable failure when attempting to use kerosene under actual working conditions in the field. The most reliable method of lubrication is to force fresh oil to each moving part, crank pin bearing, main and camshaft bearings, gears and cylinders and drain it into a reservoir from where it is drawn from time to time.

In his paper on the fundamentals of tractor transmission design, Mr. Greer analyzed the different forms of transmitting engine power to the driving wheels and divided the industry into two schools. One school of designers favored the rough open gearing using large plain bearings, while the other advocated inclosed gears mounted on shafts running on anti-friction bearings.

The question of wheels as opposed to other types of final drive is far from settled, it was shown. Statistics show that where the creeper form of drive works well in one instance, the large wheel type of tractor is often useless, and vice versa. Where wheels are used, they should be at least 5 ft. in diameter with 8 to 15 hp. drawbar pull for general work.

Inasmuch as the four papers were crowded into the small space of 3 hr., there was little time for discussion.

TRUCK CONVOYS NEAR SEA

Washington, Feb. 4—Special telegram—The five motor truck convoys en route to the eastern seaboard from Detroit are nearing their destination. The convoys have had to contend with the most severe winter storms in their journey and in several instances were snowbound for two and three days at a time. The convoys are traveling one day apart.

Twin-City the Leader

Stages Biggest Show Ever Held in Motor Industry and Makes it Automotive

Exhibition Space of 230,000 Square Feet Is Used

MINNEAPOLIS, Minn., Feb. 5—Special telegram—The Twin-City show is the biggest thing ever staged in the motor industry. It is bigger than the New York and Chicago shows together. There are about 230,000 sq. ft. of floor space, whereas New York, Chicago and Boston each run but a little over 100,000 each. The show is more than a motor car show. It is automotive and industrial. There are cars, trucks, tractors, plows, farm lighting plants, washing machines, milking machines and many other power appliances that are coming into use on the farm. There is also a big industrial display of all sorts of materials and goods that the Northwest farmers and city people are buying at the show. There is also one airplane ex-

hibit. There is a big display by the United States Food Administration and another by the Red Cross.

The Food Administration is running a movie show and the Fuel Administration is trying to teach people to burn tamarack firewood. The crowds have beaten all records. At 3 p. m. Monday the gate facilities proved inadequate and officers of the association had to stand at the gate and take money and pass the crowd in without tickets. Despite the nearly 3 miles of aisles the building was crowded uncomfortably. The restaurant fed over 3000 persons. Most of them ate on a cafeteria plan that works as fast as the assembly of a Ford car. There is a big dance floor in the basement.

Four floors of the Overland building are used. It is a quarter-mile around the outside. The building is half way between Minneapolis and St. Paul. The Twin Cities have got together on this show, which is an achievement in itself. The lack of harmony between the two big cities of the Northwest has been national gossip for years, and it has remained for the automotive men of both towns to bring them together. Every one in the show is enthusiastic about it. The Twin Cities probably never will hold another exclusive motor car show.

Ford to Build Chasers

WASHINGTON, Feb. 2—The Ford Motor Co. has received contracts from the Navy Department to build submarine chasers. The boats will be fabricated at the Ford plant and are to be 200 ft. long. They will be shipped to the coast in fabricated condition and assembled there. Work already is started and the entire third floor of the Ford plant is reported to be used for this purpose. This naturally will reduce materially the Ford passenger car production.

The Ford method of building motor cars on the progressive assembly plan will be followed in the construction of the new boats, which Ford is said to have designed himself for the Navy. The fabricated parts of the boats will be assembled in sections. It is planned to have the hull, corresponding to the frame of the motor car, move on a conveyor from department to department, gradually being completed and made ready for launching. The Ford U-boat destroyers will be launched on the Great Lakes and brought to the coast under their own power.

TO TEST GARABED

Washington, Feb. 4—Special telegram—Garabed, the new energy which is reported to drive anything from an airplane to a battleship without fuel, is to be tested officially in Boston by eminent scientists to be selected from the faculties of Harvard, Yale, Massachusetts Institute of Technology and the Worcester Polytechnic Institute. It was learned here today that just before the resolution was passed authorizing the tests, the British embassy promised the inventor that if the United States Government did not accept the invention, Great Britain wanted the opportunity to do so.

Recently a bill was introduced which provided for protection of the rights of the discoverer of this energy. It is supposed to have been invented by one G. T. K. Giragossian.

\$1,000,000 FOR OHIO TRACTORS

Columbus, Ohio, Feb. 1—By direction of Governor Cox of Ohio the sum of \$1,000,000 has been set aside by the Ohio Industrial Commission from its reserve compensation



—Photo by Kaufmann & Fabry Co.

Luncheon of National Association of Show Managers at Congress Hotel

funds for lending to country banks in order that they in turn can loan to farmers for the purchase of tractors. Tractor manufacturers and salesmen in a recent conference claimed that the chief difficulty was in getting banks to lend money for the purchase of farm tractors. This will be obviated under the Ohio plan of distributing the surplus funds.

Through the efforts of Ohio state officials, and more especially Governor Cox, a tractor school and show will be opened in one of the large machinery halls at the Ohio fairgrounds Feb. 11 to continue for a week or more. More than twenty manufacturers of farm tractors have wired that they will ship tractors to the school with trained instructors.

Tractor manufacturers have assured the state officials that the available supply will be sufficient to take care of Ohio.

U. S. CONTROLS FUEL OILS

Washington, Feb. 5—Special telegram—By a proclamation of President Wilson control of fuel oil last night was taken over by the Government. This does not include gasoline or kerosene or other oils, though it is probable these will be taken over later. Authority is vested in Mark L. Requa, head of the oil division of the Fuel Administration. A licensing system is to be used both in the manufacture and the distribution of all fuel oils.

COMPLETES CLASS B ENGINES

Muskegon, Mich., Feb. 1—The Continental Motor Corp. has completed the construction of the first shipment of class B truck engines for use by the Government, in nineteen days and 18 hr. from the time of the receipt of the drawings. This same force of men broke the former record by completing a sample class A engine for the Government in sixteen days and 20 hr.

ST. LOUIS ELIMINATES GLARE

St. Louis, Mo., Feb. 4—A lack of lenses in the market to meet the big rush to equip all motor cars has delayed ten days the enforcement of the St. Louis anti-glare ordinance. There is some confusion over the kind of lens necessary and the city has established a test station at the city hall, where any lens can be measured. In the last three days of January 357 tests were made. Director of Streets Talbot, who is in charge of the tests, says that it has been established that no lens will meet the requirement under all kinds of lamps. The lens tested and the number accepted were:

LENS	ACCEPTED
Corning Conaphore	10
Contralite	4
Culver radio	1
Daylite	4
Florentin	6
Glar Kilr	1
Ground glass	13
Holophane	1
Lenslite	7
Macbeth	10
Morelite	26
Nu Ra	9
Osgood	139
Prismolite	1
Saferlite	10
Star Lancaster	5
Sun Ray	1
Warner	36

All devices that used celluloid or paper back of a plain lens have been rejected. The law states that all lenses must be etched and diffuse a white light.

Trucks to Break Jam

Committee for Constant Service in Washington to Meet Freight Congestion

U. S. Pathfinder Car to Map Official Army Routes

WASHINGTON, Feb. 5—Special telegram—To aid the Government in breaking the present nation-wide freight congestion the National Automobile Chamber of Commerce has appointed a motor truck committee for constant service in Washington. The committee is appointed as a result of the recent convention of motor truck manufacturers in New York Jan. 8. At this gathering, three men closely allied with war activities pointed out the need for the motor truck committee. These men were Christian Girl, Roy D. Chapin and Hugh Chalmers.

It was explained that the importance of the motor truck constantly was increasing, not only as a war factor but as a great and immediately available medium dealing with freight congestion.

The committee includes Windsor T. White, president of the White Co.; M. L. Pulcher, general manager Federal Motor Truck Co.; David Ludlum, president Autocar Co.; D. C. Fenner, Mack Motor Truck Co.; George M. Graham, Pierce-Arrow Motor Car Co., chairman. The committee will work in contact with the Highways Transport Committee, which has charge of the highly responsible task of diverting traffic from railroads to highways to restore normal distribution through its direct touch with the motor truck industry and with shippers all over the United States.

The committee also will be available to all other departments of the Council of National Defense or War Department for any service it may be able to render. It also will render to manufacturers of motor trucks all over the United States such assistance as they may call for. Temporary headquarters have been taken in the Ouray building here. It is planned soon to start a store-door motor truck experiment at Philadelphia, by which merchants will have goods in freight cars delivered to them by motor truck under railroad direction immediately upon arrival at the destination instead of allowing freight congestion by having freight await merchants' calling for it. The plan at Philadelphia awaits only the final approval of William G. McAdoo, which is expected any day.

The pathfinder car of the Highways Transport Committee starts this week on a new task of mapping out Army truck routes for the Government. The committee already has laid out an official route from Detroit to the seaboard and another from Buffalo to the seaboard. It now is proposed to tap every truck manufacturing point in the Central West and pick out feeder lines to two great main highways running eastward. The pathfinder will go as far west as the Mississippi river and will map routes from cities in Wisconsin, Illinois, Michigan, Indiana and Ohio. Ray-

mond Beck, field engineer of the Highway Transport Committee will be in charge. With the car will be Major W. D. Uhler, formerly state highway engineer of Pennsylvania and now connected with the motor transport service of the Quartermaster Corps and Capt. E. B. Butchers, bridge engineer of the Engineer Corps. As each state line is reached a representative of the state highway department will join the car and proceed over the roads of his own state.

When this trip is completed the Government will have four main highways forming connecting links between the great manufacturing centers of the country and the Atlantic seaboard. Motor transports on their way to France will follow these routes and will carry cargoes to relieve freight congestion.

WOMAN DRIVERS SELL W. S. S.

Chicago, Feb. 4—The woman emergency drivers' organization here is taking active part in the sale of war saving stamps. Today twenty-four of the members in full uniform, will begin stopping motor cars on the boulevards for that purpose, by permission of the chief of police. Every motorist will be asked to buy the savings stamps and, if he cannot do so just then, will be supplied with literature explaining the war saving campaign.

IN RE MONDAY CLOSING

Washington, Feb. 4—Special telegram—The majority of industries represented in Washington are strongly in favor of discontinuing the Monday closing order, because it is not resulting in the economy of coal which was contemplated. It is known that Dr. Harry A. Garfield and William G. McAdoo were considering suspension of the Monday closing order. They will hold a conference again tomorrow on this matter, at which time a decision will be reached. The conference of last week, and the partial decision to countermand the Monday closing order, was induced in great part by a speech by Congressman Smith, of Michigan, in which he shows that the closing of industry in Grand Rapids last Monday produced an actual saving of 6 tons of coal. In addition, he discussed the situation in Detroit, taking for example Dodge Bros., who, he stated, had their force dissipated 70 per cent by the order, despite the fact that they are working on munitions for the Government and have a full supply of coal on hand. He testified that Dodge Bros. are making cannon for our Army and purchased 100,000 tons of coal last February, which has been delivered. From their coal pile they supplied 3000 families in Detroit, who were permitted to come and take and use the coal. Mr. Smith went on further to show that the Monday closing order did not save an ounce of coal or relieve congestion anywhere.

PENNSYLVANIA ENGINEER A MAJOR

Washington, Feb. 1—W. D. Uhler, chief engineer of highways for Pennsylvania, has been commissioned a major in the transportation division of the Quartermaster Corps and will have work dealing with truck transportation and highways.

AIR, CAR AND TRUCK ENGINES DO THEIR BEST TO HELP MAKE THE WAR END WELL

American aviators are getting some of their training in so-called ground schools, and this is a part of the ground training. The students in the gallery at the top of this picture are to all purposes aerial observers looking down from a plane 6000 ft. in the air on a part of the front line trenches, which are reproduced on the map below in such a scale as makes them appear to those in the gallery just as they would appear from a plane 6000 ft. in the air.

The instructor in the lower foreground is making various colored lights flash. These represent the different types of artillery fire and flash upon the map in accordance with the schedule at his right and at varying speeds, as shown by a stop watch. The students must make full notes on their own maps before them of the location of the shots and prepare the radio messages which they would send. These messages are checked with the actual schedule of the instructor to test the cadet's accuracy and speed of observation and transmission.

Men who are not quick and accurate enough to gather Uncle Sam's intelligence in the skies in France are eliminated at this stage of the training program, so that only the best men continue the training



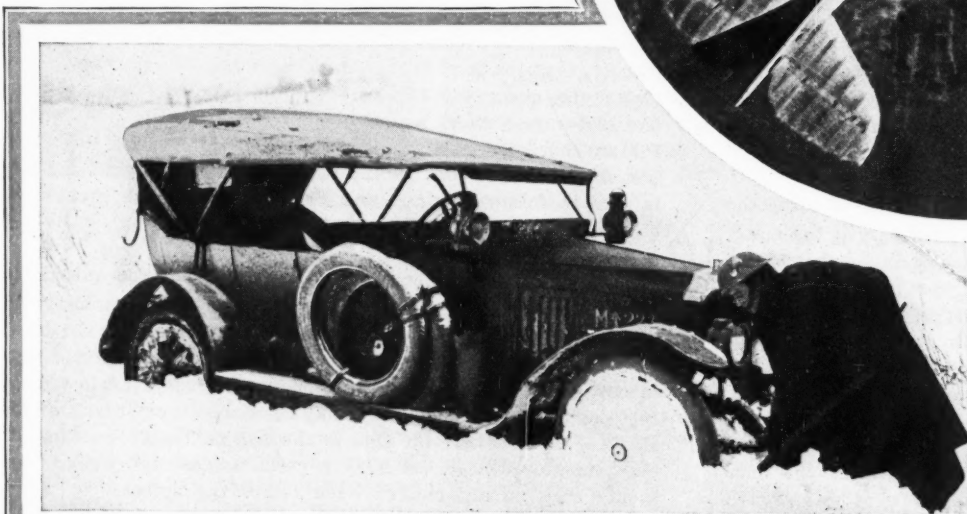
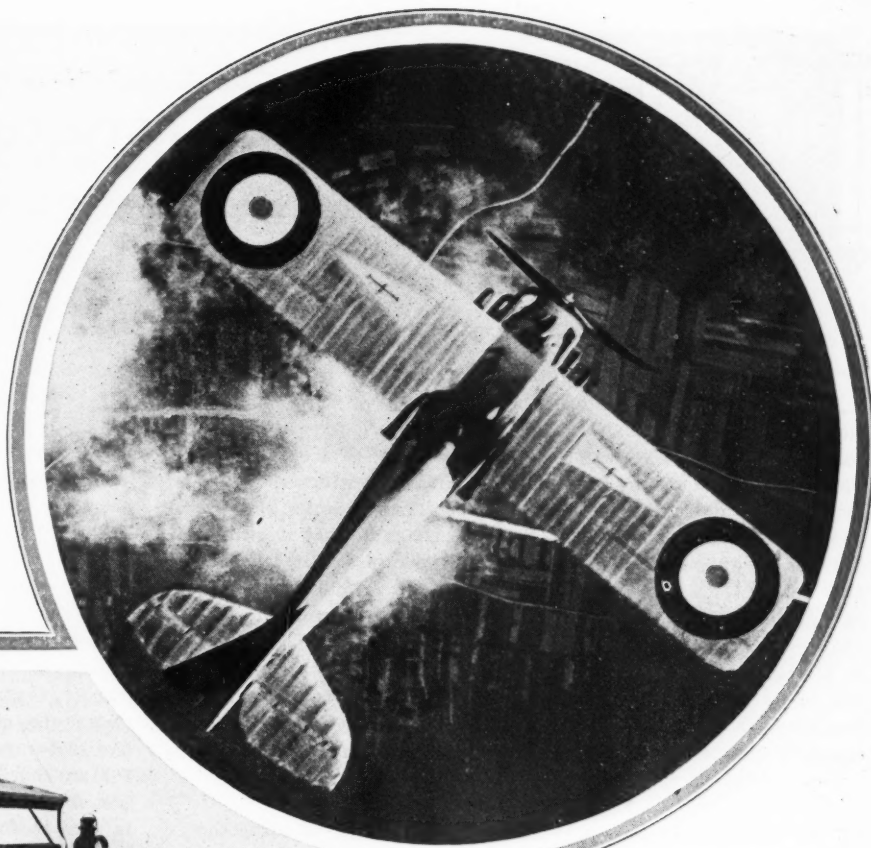
This tractor is on its way to the scene of firing operations. As it makes such low speed itself it is a matter of economy in time, if nothing else, to load it on a motor truck, which makes faster speed, and thus carry it to the front. It will be using in pulling artillery over the rough ground in the shell-torn fighting territory



This photograph of a French chaser plane hunting at full speed high above the clouds was taken at an altitude of not quite 1000 ft., coursing along at full speed, while another pilot flying above made the photograph. The clouds beneath are too small to hide the field and woods below

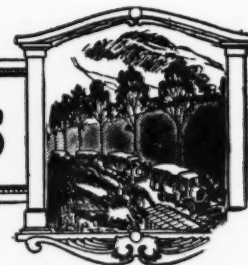
Snowbound in France, the photograph below might be called. A British soldier is digging his way out to free his imprisoned car. The snowfall in France was unusually heavy, and this scene is not so uncommon

Arrival of American Red Cross ambulances in Milan, crossing the Piazza del Duomo. Many of the American ambulances are the result of the efforts of Italian artists in this land





EDITORIAL PERSPECTIVES



War Shows Needed

CHICAGO'S Coliseum motor car show, the first real war show of the year, in that the attendance at the show is much more representative than the New York show, unquestionably has demonstrated that war shows are essential to the industry. The show must not be classed as a theater performance but rather as an industrial institution. The Chicago motor show is needed more in war time than in peace times in that it affords a desirable opportunity for dealers and makers to get together and keep in touch with the great currents of public opinion in relation to the motor car, the trucks, the tractor and the motorcycle. In war times it is more essential for all to keep in closest co-operation than in peace times. Greater problems are to be handled in war days than in peace days. More effort must be expended in war times than in peace times to gauge correctly the needs of the people and the changes in industries.

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THE Chicago war show week offers an ideal time to bring the industry together for such a purpose. Not only is the motor car industry brought together but the tractor industry and the truck industry. Chicago show week each year is becoming more and more of an automotive show week. It is no longer a motor car show week. It is a truck show week, it is a farm tractor show week and it should also be a motorcycle show week. Just as the manufacturers of motor cars are now under war dictates manufacturing motor trucks, airplane parts, tractors and tractor parts so the merchandising end of the industry is changing from simply motor car to automotive. The dealer who once sold only cars now is selling trucks. For years it was argued

that the car dealer was not a good truck dealer. That doctrine has been exploded. The motor car and truck dealer helped.

✱ ✱

TO go a step further. The dealer now selling cars and trucks is starting to sell farm tractors; in fact, the tractor makers are looking more and more to the motor car and motor truck dealer to handle the tractors.

✱ ✱

THE motorcycle business is going to receive a wonderful impulse because of the war. Already orders have been placed for perhaps 40,000 motorcycles for the war. Tens of thousands more will be ordered. This can mean but one thing, namely, that tens of thousands of men will be converted to the motorcycle under war regime and they will not drop away from the motorcycle when war is over. The motorcycle is destined for an enormous gain in America. The improvement of roads means the greater use of the motorcycle; in fact, this country is sure to follow England and France in the much greater use of the motorcycle.

✱ ✱

THE motor car dealer, who will soon become the automotive dealer, is certain to take on the motorcycle. Gradually the entire gamut of automotive apparatus is coming into the hands of the motor car dealer, just as it is centering more and more in one group of manufacturers. With this condition approaching the motor car show of to-day must become the automotive show of to-morrow. Chicago is the logical center, in fact, the only suitable center, for such a great automotive week. The sooner such an automotive week comes the better.

Motor Car Salons

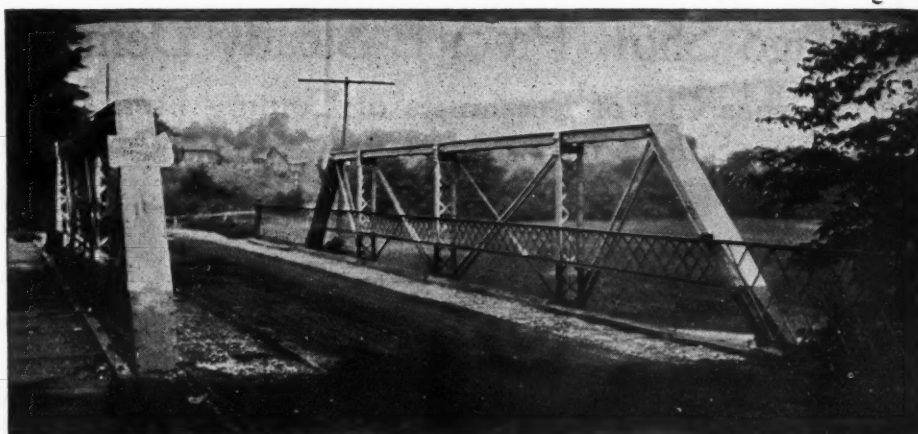
THE management behind the Salon shows in New York and Chicago has a little problem ahead of it in securing a suitable place to hold the salon in Chicago. The New York salon in Hotel Astor can accommodate perhaps a hundred or more motor cars which would represent as high as thirty different makers, but the present quarters in the Congress hotel, Chicago, furnishes accommodations for only twenty cars, which means six makers. In that the New York and Chicago salons are under the same management and are intended for the same list of makers it is impossible to continue having a salon with a big list and big accommodation in New York and a small list and practically no accommodation in Chicago. It is necessary to secure in Chicago some space that has about the same capacity as the Hotel Astor.

IT is understood that several makers applied for space in the salon shows this year, and they could be accommodated in New York but not in Chicago. They could not exhibit in the salon in New York and still get into the Coliseum in Chicago, because the National Automobile Chamber of Commerce, Inc., which stages the Grand Central Palace and the Coliseum shows will not permit any of its members to go into the salons and still be in its own shows. It is to be hoped that before next year the salon management will secure some Chicago space which compares favorably with the space in Hotel Astor, New York, so that it will be possible to double the number of exhibitors and have a real show in both cities. The present Chicago salon is too small. There are not enough exhibitors to draw the crowds which are needed at such a show.

Motorizing the Farm

THE economic inefficiency of the horse is demonstrated by the fact that for the 25,000,000 hp. developed from animals in this country to-day, it requires the product of 125,000,000 acres to feed the animals. A glance at these figures almost would lead one to believe that it would be good policy to abandon the horse. However, this is not true for these are times in the year when a tractor has been found impractical and the tractor farmer therefore feeds a certain number of horses regardless of his attempt at complete motorization.

USES of the tractor are many besides that of working the soil. The tractor is the farm's portable power unit just as the electric motor is the portable unit of the city. The belt-power attachments with which practically all tractors are equipped enables them to be used for loading cribs, threshing, shelling, cutting wood and a multitude of other things about the farm. As a road machine the tractor can haul large loads by trailers. Yet all of these uses are limited to a more or less extent by the condition of the soil.



Weak Links—"Unsafe for Heavy Traffic"

YOU often hear of the chain of highways in this country. It is an excellent expression. The highways are great, long bars—the bridges are the links joining the bars in huge chains. Obviously, the chain is as strong as its weakest link. Build a powerful lengthy stretch of highway, join it by two frail bridges with other highways, and the chain is useless for much heavy travel.

Here you see two pictures of bridges.

There are five such bridges on the main highway between Buffalo and New York. There are many more in Pennsylvania, Ohio and Michigan. All the efforts for keeping roads clear of snow in winter and maintaining them in summer will be expended uselessly unless the bridges are improved or rebuilt to withstand the heavy strain of the thousands of trucks which will be driven overland by the Army this spring and summer.

Michigan Makers Unite for Driveaways

State Aid Slated to Meet Upkeep Expense

DETROIT, Feb. 1.—Motor trucks and passenger cars will be rendered independent of railway blockades according to the plan adopted by motor car manufacturers in conjunction with the county commissioners and the Michigan war preparedness board. Furthermore, the industrial centers of Michigan will not again be cut off from the rest of the country by railway tie-ups and embargoes.

Motor car manufacturers of Michigan are preparing now to meet the situation which may arise to prevent rail shipments of passenger cars and motor trucks. Winter and summer driveaways will be operated on a systematic basis with the co-operation of state and county authorities. At a meeting held here and presided over by State Highway Commissioner Frank Rogers, the main trunk lines to be kept open all year around were designated, and provision was made to meet the expenses of maintenance. Under present arrangements the state will pay at least half the cost of maintaining the through roads, while the county funds will take care of the balance. Attorney-General Grossbeck stated that the Michigan war preparedness board will finance the project out of its \$5,000,000 fund.

Representatives of the Olds Motor Works, Buick Motor Co., Oakland Motor Car Co., and other concerns from outside of Detroit, as well of Dodge Brothers, the Cadillac Motor Car Co., and the Cleveland Tractor Co. of Detroit, were present. The two heavy snows which have made travel impossible through this state during the last three weeks have forced makers to abandon driveaways and hence to stop

shipments altogether. It is assured that co-operation between the manufacturers themselves, as well as on the part of the state and county authorities, will result in opening for traffic roads that would be otherwise impassable. This means the practical salvation of industries which under present railroad conditions would be in bad straits.

The highways concerned opened up the interior of Michigan to cities in communication with Detroit and Toledo, as well as to Chicago and points west. Five roads were proposed to receive immediate attention. They are as follows:

From Alma to Saginaw, Flint, Fenton, Holly, New Hudson, Detroit, Monroe and Toledo; following the Grand river west from New Hudson to Lansing, by way of Howell; one road to Chicago, by way of Charlotte, Battle Creek and Kalamazoo; another to Grand Rapids, via Ionia and Lowell, and another from Flint to Port Huron, via Lapeer, Emlay City and Capac.

UNITING TO MAKE DRIVEAWAYS

Lansing, Mich., Feb. 1.—The Olds Motor Works, the Reo Motor Car Co. and the Auto Body Co. have joined hands, at least temporarily, to ship part of their outputs and have formed what might be called a snow-shoveling brigade. More than 100 men now are occupied in clearing the roads from Lansing to Detroit, so that motor cars and bodies may be shipped overland to Detroit and there connect with the military motor truck road from Detroit to Cleveland and Toledo.

Shipping conditions during the last ten days have become so acute that these con-

cerns had to lease warehouse space, as their plants were being filled with the finished product which could not be shipped, except in such small quantities that some action had to be taken to overcome unusual condition. A few days ago the Reo Motor Car Co. leased part of the Owosso Sugar Co. plant to store 200 trucks and cars. At the Olds Motor Works it was stated that it is not possible to get freight cars and owing to the bad weather passenger cars hardly can be moved by the usual driveway plan. The Auto Body Co., which is furnishing bodies to the Scripps-Booth Co. of Detroit, is also practically unable to make any shipments. It is for these reasons that these three companies have combined and will try to clear the main roadway to Detroit.

WHEELBASE DETERMINES FEES

Calgary, Alberta, Feb. 1.—In this province one of the favorite diversions seems to be the passage of freak laws. Not content with the standard S. A. E. horsepower formula as a basis for figuring license fees, an order-in-council was rushed through the provincial legislature at the last minute which bases the license fee on the wheelbase of the car. The figures are as follows:

Not exceeding 100 in.....	\$15.00
Not exceeding 105 in.....	17.50
Not exceeding 110 in.....	20.00
Not exceeding 115 in.....	22.50
Not exceeding 120 in.....	25.00
Not exceeding 125 in.....	27.50
Not exceeding 130 in.....	30.00
Not exceeding 135 in.....	32.50
Exceeding 135 in.....	35.00

This is from 30 to 60 per cent higher than the 1917 scale, based on S. A. E. horsepower.

Chicago Show Predicts Steady Demand

Hushes Cry of Pessimists of Coming Disastrous Slump in Prospects for Motor Cars

CHICAGO, Feb. 2.—There will be no disastrous slump in the popular demand for motor cars that has been predicted by the pessimists. That the American public, or at least that part of it in the Middle West and West, is looking for motor cars has been exemplified by the Chicago show. The Chicago show is primarily a dealers' show and it is consequently a very good prophet concerning the demand for the motor car which will be made by the people in this part of the country. If the predictions of the show hold true, then we may expect a steady demand for the motor cars throughout the coming season. Prospective buyers are studying the efficiency and upkeep, however, as they have not done before.

Chicago's first wartime motor car show closed tonight after a most successful week. In spite of the fact that the show was closed on Monday, the attendance for the first four days was heavier than for a corresponding period last year. Although the total attendance was more than 150,000, it was not quite so large as the last two years. The crowd was totally different from those of previous shows, as there were few mere onlookers and everyone was interested.

A Trade Barometer

From a business standpoint, the Chicago show always has been regarded as the trade barometer of the year, and this year it certainly lived up to expectations, as exhibitors reported large retail sales and an unusually large amount of business with the dealers throughout the country. The large dealer attendance was unexpected, especially as they appeared in almost twice the strength that they had shown in former years.

The dealer is the farmers' business criterion, and if we have judged rightly we may expect a large business from the agricultural districts of the Mississippi Valley and the territory to the north, west and south of it. The coming of spring probably will bring relief to the transportation-bound farmer and he will be in a position to move his products to market and thus act as a stimulant to business in these districts. It seems from this that the economic value of the motor car has been brought home to the farmer as has also the other power units for which the internal combustion engine is the prime mover.

In the past we have heard the cry of the calamity precipitator that the handwriting was on the wall for the motor car industry, but the public itself has answered these disciples of curtailment in a most effective manner by placing its stamp of approval upon the industry. It is utterly absurd for persons to fear for an industry that is the third largest in the country. However, it must not be assumed that it can sail along unaided like a phantom ship and arrive at its predetermined point of prosperity. This is not true of any industry. It must have a nucleus, a platform upon which to build and in this instance the dealer must be the platform. He must furnish the incentive in

this time of national necessity, a time in which everyone must be 100 per cent efficient, and the motor car is the prime requisite toward the desired end.

Every exhibitor was enthusiastic regarding the outlook for business, which is certainly most promising. Never before in the history of the shows have people shown so much real interest in the motor car. Great numbers of retail prospects were secured, not just ordinary prospects, the extent of whose ambitions is to ride in a motor car, but prospects who intend to purchase motor cars because they realize that the car is a necessity with which they can not part.

In common with the unprecedented activity in the motor car field, the accessory business also felt the touch of business stimulation and looks forward to a renewed era. The chief problem in the accessory business is keeping the old car young, and this is indeed a most promising field. Many interesting devices have been developed in the last year, especially with reference to conservation of fuel, which just at the present time is a most pertinent subject.

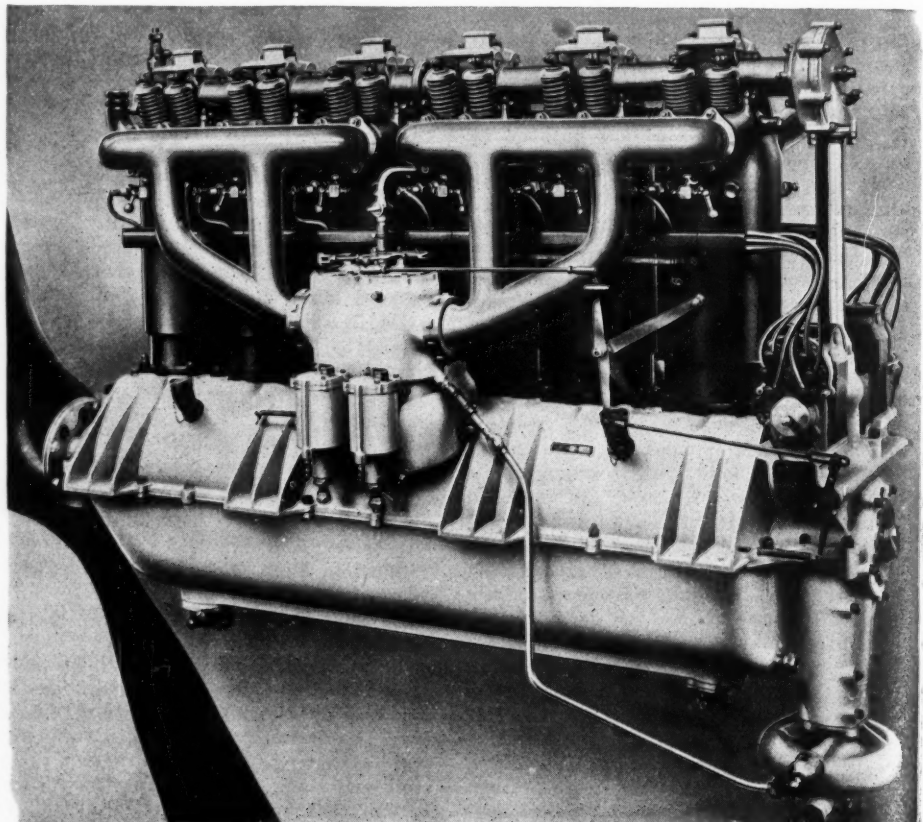
OPTIMISTIC SPIRIT AT SALON

Chicago, Feb. 2.—Chicago's salon reflects the same spirit of optimism that is noticeable at the Coliseum. The exclusive exhibit of costly cars in the Elizabethan room

of the Congress hotel drew a better attendance this year than it ever has in the past. This exhibit is always a direct-to-the-consumer proposition rather than a dealer's show, and between fifty and sixty cars were sold at retail. Among these, one was the sale of the Rolls-Royce to Al Woods, the theatrical man. The salon exceeded expectations both from a business and an attendance standpoint, and unless war conditions make it impossible next year, it is probable that the extent of the exhibit will be doubled or tripled. Space permitted the exhibit of only twenty cars as against eighty in New York, but it is anticipated that there will be at least sixty on view if the plans for enlargement which Manager Eustis is making are carried out. Mr. Eustis says the salon is bound to grow because it caters to the growing demand for custom bodies.

ALL READY AT DES MOINES

Des Moines, Iowa, Feb. 2.—Everything is in readiness for the Des Moines show, which will open at the Coliseum Feb. 18. All space has been sold and the decorations are set. There will be forty-seven exhibitors this year. Three blocks from the Coliseum the second annual truck show will be on during the same dates. Managers of the show state that with the unusual prosperity which Iowa has enjoyed during the last year they look for the biggest show ever held here. A military aspect will surround the show this year and as there are many thousand soldiers at Camp Dodge it is likely there will be a heavy attendance of the men in khaki. One night during the show probably will be designated as soldiers' night. A quartette



Fiat engine with which Lieutenant Brak Papa set new record of 23,048 ft. in 1 hr. 3 min. in a one-passenger biplane

from the headquarters company at Camp Dodge will be one of the entertainment features of the show.

Following the plan originated by the Des Moines dealers a year ago all individual advertising by dealers was suspended Feb. 1 and until after the show none will be done. All advertising during the next three weeks will be handled by the show managers. This plan was a big success last year and has been used by several cities this year.

MISSOURI DATES ROAD WEEK

Kansas City, Mo., Feb. 2.—County judges, highway engineers and road overseers of Missouri are being urged to attend the meetings of the Highway Engineers' Association of Missouri to be held at Kansas City Feb. 27 and 28 and March 1. This event will be the chief feature of Road Week of the state, which originally had been planned for earlier. At Kansas City moving pictures of the convict road camp operated under the direction of the state highway department will be shown, and a special effort will be made to harmonize the work of the county officials over the state. A similar Road Week is to be held in St. Louis in connection with the convention of the American Road Builders.

MAJOR SHEPLER TO CLEVELAND

Washington, Feb. 2.—Major Harry Shepler, formerly vice-president of Willys-Overland, and now in charge of production for the aviation section of the Signal Corps, is moving his offices to Cleveland, Ohio, and will have charge there of the government aviation production supervision. As was announced last week, these offices are moved to Cleveland so that they can better supervise the factories engaged in airplane work, the majority of which are located in cities close to Cleveland.

A PACKARD TRAIN A DAY

Detroit, Feb. 1.—Government trains of Packard trucks are scheduled to leave the factory at the rate of one train a day, or a complete convoy each week. There are thirty trucks to a train and six trains, or 180 trucks make up a convoy. It requires eighty men to handle the train, and these are under the direction of a lieutenant. The convoy is under the direction of a convoy officer who is located in Detroit. Practically all the trucks going forward in these convoys are destined for the expeditionary forces.

AA PARTS UP TO ASSEMBLER

Washington, Feb. 2.—The motor transport section of the Quartermaster Corps plans to issue contracts for the assembling of the class AA trucks in about the same manner as is being pursued with the class A truck. This means that the manufacturers, or assemblers, will deal directly with the parts makers. In the case of the class B truck, the Government dealt directly with the parts makers and supplied the parts to the assemblers.

BANE ON TECHNICAL AIR BOARD

Washington, Feb. 1.—Lieut.-Col. Thurman H. Bane, Signal Corps, has been appointed a member of the joint Army and Navy technical aircraft board.

U. S. Has 80,000 Aviators Available

European Developments in Aviation Explain Delay in American Program to Make Changes

WASHINGTON, Feb. 2.—Eighty thousand aviators, trained and nearly trained, are available now for the American aviation fleet. America's airplane program, which will cost \$1,000,000,000, in addition to the \$640,000,000 already expended, has been delayed two months because of necessary changes in the type of combat machines, due to altering plans to meet the ever-changing German tactics. Delay also has been caused by the drafting of thousands of skilled toolmakers into the National Army.

The investigation of airplane activities by the senate military affairs committee has not developed as much specific information as it had hoped would come out, which is perhaps largely due to the fact that Howard E. Coffin, chairman of the Aircraft Production Board, asked for secret sessions, principally because many questions of design would come up for discussion and it was considered advisable that such information should be kept private. In the investigation Col. E. A. Deeds of the Signal Corps also was questioned at length. Some parts of the testimony showed good progress in our airplane program and other parts showed a lack of progress. Senator Chamberlain in conducting the inquiry was inclined to place the blame for any delay on the head of the Secretary of War rather than on Messrs. Coffin and Deeds.

The evidence given by Mr. Coffin largely had to do with questions of airplane design, changes of types of airplanes, airplane production, aviation tactics in war and the training of aviators. Mr. Coffin's evidence favored the support of bills favoring the war cabinet and also a director of munitions.

It has been necessary to change the entire program at least twice because of developments in Europe, where the second battle of Verdun showed that a change of type was necessary. The life of a battleplane used at the front seems, from the Verdun experiences, to be about two months, after which it is worn out and must be replaced with a new machine. Col. E. A. Deeds testified that the proposal to appropriate \$1,000,000,000 for the airplane program is not an over-estimate of the needs of the service and that this amount will be necessary for the program recommended by General Pershing and adopted by the War Department.

New Altitude Record

TURIN, Italy, Dec. 22.—On the military airdrome in this city Flight Lieut. Francesco Brak Papa has established a world's height record with a one-passenger by climbing to an altitude of 23,048 ft. in 1 hr. 3 min. The machine, a Sia-Fiat biplane built in the shops of the Fiat Automobile Co., carried a useful load of 792 lb. The climb was made at the following rate: 3280 ft. in 2 min. 30 sec.; 6562 ft. in 5 min.; 8942 ft. in 9 min.; 13,123 ft. in 15 min.; 16,400 ft. in 24 min.; 19,685 ft. in 37 min.,

30 sec.; 21,325 ft. in 45 min., and the maximum height of 23,048 ft., as stated, in 1 hr., 3 min. The previous record, which also was held by Lieutenant Brak Papa, was 21,161 ft.

The engine with which the record flight was made is a standard six-cylinder vertical Fiat with a cylindrical capacity of 1324 cu. in. and developing 300 hp. It has four valves to a cylinder and direct mounted propeller. Cylinders are of steel with welded-on sheet steel waterjackets. The same type of engine is used by the American Army in France.

DUESENBERG BUYS FIAT PLANT

New York, Feb. 5.—The Duesenberg Motors Corp., Elizabeth N. J., has purchased the buildings and equipment of the Fiat Co., Poughkeepsie, N. Y., and will commence immediately the removal of the bulk of the equipment to its Elizabeth plant. The Fiat Company will continue to occupy a part of the buildings and the production and assembly of Fiat cars will go on much as usual.

The Duesenberg Company has purchased the property and equipment in order that it might obtain immediately a large amount of machinery with which to carry on the production of airplane engines for the government. At the present time, Duesenberg is concentrating its entire manufacturing facilities on the production of Bugatti airplane engines for which it has a large contract.

The production of Duesenberg engines has been entirely stopped, though at some future time arrangements may be made with some western engine builder to manufacture the small four Duesenberg.

CHICAGO SHOW MEETINGS

Chicago, Feb. 1.—Jobbers, garagemen, dealers and show managers all had their days during show week through the meeting of their various associations. The National Association of Automobile Show Managers planned a national advertising campaign to boost business and will hold dealer mass meetings at all the shows where it is possible to make arrangements. It was reported that with Cleveland, Minneapolis and Kansas City using one decorator, E. W. Campbell of Boston, the three shows are saving about \$15,000.

The Garagemen of Illinois, who have been building a state association for four years, held their fifth annual convention and changed the name to Garage Owners & Automobile Dealers' Association of Illinois, making provision for membership of dealers who do not operate garages. The organization has 585 members, and 400 more contributed \$3 each to the lien law legislative fund of \$2,100. Charles L. Turner, Peoria, was made president. The other officers are: First vice-president, John McNeil, Centralia; second vice-president, Fred R. Young, Moline; secretary-treasurer, H. E. Halbert, Chicago.

The standardization committee of the National Association of Automobile Accessory Jobbers met and recommended standard names for types of spark plug. Instead of "standard" or "regular," the committee recommends the use of the word "regular." Instead of "extension," the terms "long" and "extra long" are recommended. The committee also is considering the elimination, if possible, of the $\frac{3}{4}$ -in. size. An investigation is to be made to see if fewer sizes will not suffice. The principal sizes otherwise are the "regular," "long" and "extra long" in $\frac{1}{2}$ -in., $\frac{7}{8}$ -in. and metric sizes. The retention of the metric size is recommended as a step toward after-war business abroad. The $\frac{3}{4}$ -in. plug is said to be used mostly in farm implement and tractor trades.

The National Automobile Dealers' Association, which was formed here last summer, chose a new slate of officers. The new president is Fred W. A. Vesper, of the Vesper-Buick Co., St. Louis, Mo. The other new officers are: First vice-president, John A. McAlman, Boston, Mass.; second vice-president, Prince Wells, Louisville, Ky.; treasurer, Thomas J. Hay, Chicago.

The by-laws have been amended to admit dealers who are not members of city associations. The association has 594 members. Alfred Reeves, general manager of the National Automobile Chamber of Commerce, told of the work done at Washington since the beginning of the war and urged the dealers to become more strongly organized and to take an active part in national affairs. The lack of effective organization at the time the present tax on cars came up was pointed out as a sample of occasions that are likely to arise at any time. The delegates voted in favor of a strong membership campaign and a campaign of education throughout the trade. Much attention is to be paid to good roads.

FRANKLIN REQUIRES DRIVEAWAYS

Syracuse, N. Y., Feb. 1—To conserve freight car shipments, the Franklin Automobile Co. is refusing to ship cars by freight unless delivery cannot be made in any other way. In this way 530 cars have been sent away from the Franklin factory under their own power during the last four months. Figures compiled by Franklin show that as much as 15.7 per cent of the total shipments of Franklin cars during the four months just passed were driveaways. During August 21.8 per cent of the total shipments were made overland. The new policy, if carried on a year, at this rate would save 525 freight cars a year, it is estimated by Franklin.

OHIO DEALERS TO ORGANIZE

Columbus, Ohio, Feb. 2—A meeting of the motor car men of Ohio has been called at the Virginia Hotel here Feb. 6 to organize the Ohio Automobile Tradesmen's War Service Committee. The meeting is at the request of A. W. Shaw, chairman of the economy board, National Council of Defense, and one man from each county has been selected to act as county chairman and meet in Columbus to perfect the organization. Thousands of mechanics have left Ohio for war service, and the organization is partly to meet the problems arising therefrom.

Shortage Causes Lay-Off

Between 8,000 and 10,000 Detroit Men Idle Temporarily for Lack of Fuel

Coal and Gas Situation Among Plants Continues Acute

DETROIT, Feb. 3—Between 8000 and 10,000 men here had to be laid off Saturday temporarily by a score of manufacturing concerns engaged in war work owing to a shortage of gas. Conditions are so acute that unless the gas company receives the needed coal and gas within the next 36 hours, 100,000 or more workers will be compelled to remain idle, as nearly all the local plants will be short of gas by Monday night. Officials from the gas company, the fuel administration and the railroads are co-operating to bring relief as quickly as possible, but the situation is considered by all as very serious. This is best shown by the action some of the biggest plants here found it necessary to take, notwithstanding that they are doing war work and thus are entitled to preferential service in getting the supplies of coal, oil, etc.

About 4000 men were laid off Saturday at the Ford Motor Co., and 4000 more may be turned home again Monday unless sufficient gas is available.

Several hundred men were laid off by the Michigan Stamping Co. owing to the shortage of gas, and the amount of coal on hand will only last four days at the most.

More than 100 men at the Northway plant were laid off, and information was given out that the plant might have to be closed Monday.

The Detroit Forging Co., the Detroit Vapor Stove Co., the McCord Mfg. Co., the Detroit Automobile Supply Co. and several others engaged in war work have closed their departments which are using gas.

These are merely a few of the most important concerns partly or entirely closed, but it is likely that there will be scores unable to continue operations next week unless gas and coal is available.

The coal situation is practically as acute as it was a week ago. The continued bad weather practically has nullified efforts made to get coal to the city. Coal dealers and railroad men state that the men are very willing to do their utmost to relieve the situation, but the severe weather is rendering outdoor work almost impossible.

Detroit Situation Serious

DETROIT, Feb. 5—Production of passenger cars, trucks and war supplies from Detroit factories is threatened seriously by the fuel shortage. The Maxwell plant may have to close down for fifteen days unless fuel is obtained soon. Paige and the Detroit plant of Studebaker will have to close to-day unless they can get fuel. Practically all the factories are running from day to day on hand to mouth fuel supplies.

Some of the concerns in little better

shape are the Lincoln Motors, which has enough for a week; Ford, with enough for eighteen days, and Packard, for ten days. The gas company of Detroit cannot supply the industrial plants with gas for the enameling ovens, etc. Motor car factories which have been using city gas for running in and testing the engines have returned to gasoline.

The confiscation of twenty cars of gas oil and several cars of coal consigned to industrial plants here by the local fuel administration Sunday and the diversion of them to the gas company's plant has relieved the situation only slightly.

AUCTION MUTUAL MOTORS PLANT

Detroit, Feb. 2—The plant and furnishings of the bankrupt Mutual Motors Co., which made the Marion-Handley car, will be auctioned Feb. 7 at Jackson, Mich., by the Detroit Trust Co., receiver. The inventory puts the assets at \$1,300,000. It is expected that the Jackson Munitions Co. will be one of the bidders.

LA CROSSE TRACTOR ADDS MILLION

LaCrosse, Wis., Feb. 4—The LaCrosse Tractor Co., LaCrosse, Wis., manufacturer of the Happy Farmer tractor, has increased its capital stock from \$1,500,000 to \$2,500,000 to accommodate its largely increased business. The company is working at maximum capacity with a force of 400 men in the execution of large foreign and domestic orders for tractors. Within the last year it has more than doubled its output and at this time it is making extensive additions to its capacity.

SIEBERLING HEADS LINCOLN

Detroit, Feb. 1—The officers and directors of the Lincoln Highway Association held their annual meeting here the other day and without a dissenting vote decided to carry on the Lincoln Highway work as a part of the great system of national highways which is so fundamental to-day. F. A. Sieberling was chosen president to succeed Lieut.-Col. Henry B. Joy, who has been president since 1913, when the association was organized, but who now expects to serve in a business administrative capacity under General Pershing.

MERCER BUCKS SNOW IN DRIVE

Chicago, Feb. 1—Possibilities of delivering cars by road from factories on the Atlantic coast to points in the Middle West, even in midwinter, were demonstrated last week by E. W. Schillo, Chicago Mercer dealer, when he completed a trip from the factory at Trenton, N. J., with the first of his 1918 allotment. His purpose was the dual one of saving a freight car for shipping Government supplies and also to give the car a thorough chassis test on the road. Almost the entire trip was made in deep snow and on portions of the road his car was the first vehicle which had traveled it for days. The car rides none the worse for its very strenuous experience and Schillo plans to drive the most of his allotment from Trenton to Chicago this season.

Mr. Schillo started from the Mercer factory Jan. 15 and reached here Jan. 23. From York, Pa., to Pittsburgh, a distance of 322 miles, he passed through a 13-in. snowfall, which in places was drifted as

high as 8 and 10 ft.* The worst road conditions were encountered from Chambersburg Pa., on where, for distances of 5 and 10 miles, he says, he broke roads which had been traveled over only by a horse and sleigh.

Road commissioners at Bedford, Pa., told him it was useless to go much farther, as the drifts at the bottom of Grandview mountain were too deep to negotiate. However, after eight attempts he finally broke through and proceeded 29 miles to Stoyestown, Pa., being the first car through that section in four days. He started for Pittsburgh next morning and just out of Stoyestown, which is on the eastern slope of a mountain, the road commissioners and others were again at work and advised him not to attempt to get through, as the drifts were impassable. However, he made the attempts and roads were broken all day. At one point between Stoyestown and Laughlontown, a distance of 7 miles, he opened roads over which there had been no communication of any kind in four days and a man had not passed in two days. He continued up over Laurel mountain, a distance of 18 miles, releasing two army trucks which had been stalled on the top of the mountain for three days, having been snowed in. In all it took about 8 hr. to cover 25 miles through snowdrifts and the hardest road conditions he ever experienced.

Between Pittsburgh, Cleveland, Toledo, Detroit, etc., roads were a succession of ice and snowdrifts, and zero weather was encountered the better part of the way. Where the drifts were too deep, it was necessary to resort to interurban tracks to get around them.

While a factory tester accompanied Mr. Schillo, only two adjustments were necessary on the entire trip. These consisted of taking up the emergency brake rod and releasing the clutch stud bolt.

CONTINENTAL EARNS \$2,000,000

Detroit, Feb. 1—In the fiscal year ending Oct. 31, 1917, the Continental Motors Corp. net earnings were \$1,396,814.17, which covers actually only about nine months of the corporation's business. The earnings before deduction of \$240,000 excess profits and income tax, depreciation and interest were \$2,052,068.12. Sales during this period increased 32 per cent over the preceding year, and the operative orders on the books Oct. 31 totaled \$16,361,000, after deducting cancellations.

F-W-D INCREASES CAPITAL

Clintonville, Wis., Feb. 2—The Four Wheel Drive Automobile Co. has increased its capital stock from \$1,000,000 to \$2,000,000. A year ago the capital was increased from \$500,000 to \$1,000,000. J. D. Cotton was elected a director to fill the vacancy caused by the death of John Kalmes, treasurer, several months ago.

ORR BECOMES A CAPTAIN

Detroit, Feb. 1—Tom Orr, former racing driver for the Maxwell Motor Co., Inc., and until recently a member of its truck sales department, has been commissioned a captain in the tractor division of the finance reserve corps.

Maxwell Offers Tractor

Moving Pictures Show Machine Doing Everything Mule Can Do but Eat

Announcement Is Made at Meeting During Show Week

CHICAGO, Feb. 1—Maxwell has brought out a tractor. The machine was sprung as a complete surprise last evening at a meeting of Maxwell-Chalmers dealers at the Congress Hotel. The tractor is a small affair with four wheels, drive at the rear axle, extension axles, 12-in. tread behind with two attachable treads, making the drivers 3 ft. wide for sand.

The price was not made public, but it was stated that it would compare as does the price of the Maxwell with other cars, which is taken to mean that it will be a low-priced machine. Production will be coming through some time this summer.

The tractor has been in process of development on a sugar plantation for four years outside of New Orleans. There it was known as "The Chief," a term applied to Walter Flanders by many in the organization. Hereafter the tractor will bear the Flanders name.

The tractor was sprung on the dealers by moving pictures, which showed the machine doing everything a mule could do except eat. One of the most important points is that the tractor is designed to draw the machinery that today exists on thousands of farms. Special machinery is not necessary. The treads even can be fitted for asphalt pavements, permitting the machine to be used in running farm products to town.

The wheelbase of the tractor is 6 ft., and the adjustable tread has a minimum of 44 in. Inclosed gear drive is through rear wheels 42 in. in diameter. The engine is cast in block with L-head cylinders, the dimensions of which are not yet fixed. Lubrication is by pressure and splash with three pumps. Ignition is by magneto.

Water circulation is by pump with a 10-gal. system.

The engine develops 900 r.p.m. at governed speed and delivers approximately 2600 drawbar pull at plowing speed, which is $2\frac{1}{4}$ m.p.h. at 900 r.p.m. The tractor weighs 3600 lb.

The question whether dealers get a square deal from the factory and whether short-term contracts are equitable received unexpected limelight last evening at the Maxwell-Chalmers dinner when Sales Manager Thomas J. Toner surprised some of those present by bringing up the subject himself. Toner stated that it costs factories hundreds of thousands of dollars every year for re-contracting, and that it looks like an unnecessary expense. He said no dealer should have to worry about how long he is going to have an agency and that no factory should worry about how long it would have a dealer. He said the dealer should be on a good basis and should be in such relationship that he could know that the only one who would lose his agency for him would be himself. The dealer should, he stated, be so sound financially and so well established and so good a business man and merchandiser that the factory would not have to worry about the continuation of the dealer.

The old-style and the modern successful dealer were shown dramatically at the dinner by a playlet called "Speed," written and played by members of the Harry Newman organization, which handles the Maxwell and Chalmers in this section. N. O. Pep was the old-time dealer, a blacksmith, and Physical Salesman was the factory man who sold agencies by bunk and force. Full O'Pep, the son, finally revised the business, took on two good agencies—guess which ones—set up a real salesroom, engaged Energy, Harmony, Truth and Loyalty, who threw out Laziness, Jealousy, Promises and Disloyalty, and married dad to Miss Efficiency while the boy hooked up with Miss Intelligent Speed. Ignorance and Failure were banished early in the play. Nut, Bolt, Wrench and Gear looked their parts. They did not appear in the finale. It was funny and got the idea across.



Arrival in Chicago of Mercer driven by E. W. Schillo from Trenton, N. J.

Mechanical Gleanings at Chicago

Changes This Year Found to Consist of
Refinement of Details for Most Part

By H. C. Skinner

Motor Age Editorial Staff

THE Chicago show exemplifies the intrinsic progress made by the motor car engineers with reference to the design of the mechanical and coach features of the present year's product. The mechanical changes this year confine themselves chiefly to the refinement of details, as no radical innovations were exhibited. Bodies, however, have received more attention than ever before, especially the inside-drive closed car for the owner-driver, and an unusual number of raceabouts are shown.

The preponderance of the sedan type of body is to be expected, as it is in common with other movements throughout the country. This type of body is shown in different styles, the type with the stationary door and window frames with drop glasses, the type in which the windows and frames disappear, making a complete open car for summer driving, and the type in which the winter top is demountable and a summer top can be substituted in its place. Of this latter type there are some very neat examples in which it is almost impossible for the casual observer to note the demountable feature unless it is a make with which one is familiar.

Thought for Comfort

Comfort for motorists has been given more thought on the part of the designer, resulting in better cushion suspension and easier forms of upholstery, although one notes some very weak examples of body engineering in which the seat locations are almost impossible. Some examples are noted in which the driver's seat is adjust-

able, making it possible to vary the distance between the steering column and the back of the driver's seat. This is a good feature, provided the seat is anchored properly, as it is almost impossible to decide on an average seat location that will prove satisfactory to all purchasers. And it is just these small, well-planned details of body construction that prove a great incentive to the prospective customer.

One of the noticeable features of the show is that cars are being made lower than they were a few years ago. This is due to

the fact that the public likes a low car and is not laying so much stress on road clearance as it did formerly. The reduction in height has been accomplished in several ways, by using smaller wheels, drop frames, flat springs, and the general appearance, by the use of tops with a low quarter line. The late-type bodies with the high panel sides also aid in giving the car a lower appearance.

In the past the motor car's equipment has not been in keeping with the remainder of the car and has been the cause of considerable criticism from the owner. This year it is noted that many of the manufacturers are giving a very complete equipment of both tools and accessories, which is an economic advantage for the ultimate consumer as the manufacturer purchases in large lots at a low cost. Thus the consumer in reality receives the benefit, as he would be unable to duplicate the car so equipped at the same first cost.

Although the mechanical changes are not numerous, they all indicate a tendency toward ease of maintenance, reduction in weight by better design and lessening the number of parts.

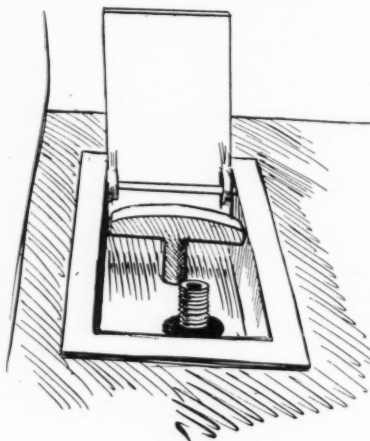
The old-fashioned, dirty grease cup rapidly is being supplanted by the more convenient and less dirty oil cup. In fact, we hope some day to possess that ideally lubricated car in which we will have only one oil reservoir to worry about or interfere with our Saturday afternoons.

Fan Belt Changes

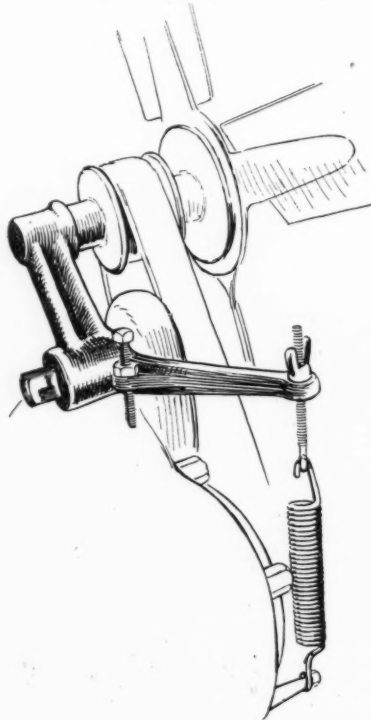
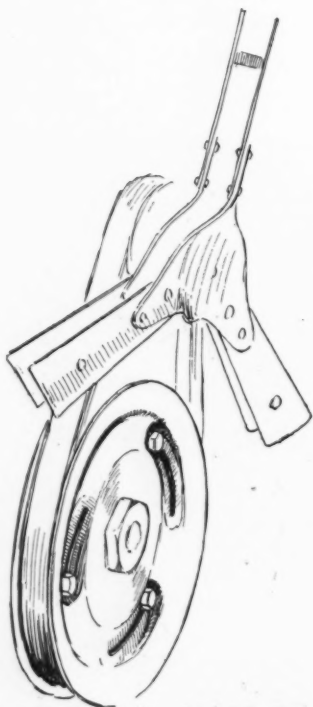
Small but convenient changes, such as simplification of the fan belt adjustment, are in evidence. Oakland offers an adjustment which operates by varying the diameter of the fan-driving pulley with the V-type belt, and the self-adjustable type is exemplified by Buick, which has a fan mounted on a movable bell crank, tension being maintained by a spring at the extreme lever arm of the bell crank.

The use of the belt as a drive for the combined generator and fan is becoming more common, as it simplifies the accessory drive and eliminates quite a number of parts. In this case the combined unit is mounted on a bracket which is capable of vertical movement at its point of attachment to the forward gear case of the engine. This provides an adjustment for the length of the fan belt. The Nash and Oldsmobile both employ drives of this type.

The Dorris is to be numbered among the converts to the Brush, or the deep-channelled frame construction, in which the weight of stock is considerably lighter than that of the customary type of frame. This construction results in a marked saving in weight and also practically doubles the strength. Its other advantages are that it eliminates the running board to frame splashers and the short running board brackets makes possible a rigid mounting of the running board. This is a type of



Kellogg tire pump on Stephens



Fan adjustment on Oakland, left, and Buick fan on movable bell crank

frame construction which undoubtedly will increase in favor to a greater extent when its advantages become recognized generally.

The engine refinements consist in many instances of the reduction in weight of the reciprocating parts of the engine proper and also that of the valve gear. Dodge Brothers, Cole, Briscoe, Apperson, Stearns and McFarlan have reduced the weight either of the reciprocating parts of the engine or the valve gear to produce a smoother-running engine. In fact, considerable effort seems to have been expended to gain smoother and more flexible engines, as Oldsmobile, Grant, Allen, Apperson, Crow-Elkhart, and Owen-Magnetic have adopted improved forms of balanced crankshafts. Thus while none of the changes are radical in departure from good standard practice, yet it indicates a steady advance in engine design and that more thought is being given to the subject in order to produce engines which have the characteristics of longevity, smoothness and flexibility.

Cadillac and American both have adopted the demountable cylinder head. This makes the removal of carbon from an engine a comparatively simple matter and also is a great time saver when it becomes necessary to overhaul an engine.

The aluminum engine is continued by its exponents with but few changes. However, Premier has made an important change in the sleeve construction by which the cooling water comes in direct contact with it instead of the aluminum casting, as heretofore. This has been accomplished by increasing the thickness of the liner and by making it so that it has a water-tight joint at both the upper and lower points of attachment to the cylinder block proper.

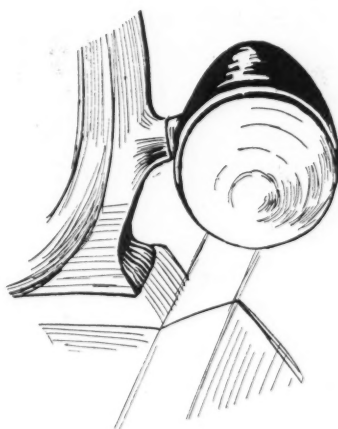
To facilitate the location of the steering unit and to avoid unnecessary complication when the exhaust is on the same side of the chassis, Nash, Marmon and Owen-Magnetic locate the exhaust pipe at the forward end of the engine. This also avoids having the intense heat of the exhaust at the driver's feet in the summer time.

Hotchkiss drive is used on more than half of the different makes exhibited at the

show. This type of drive is in reality an engineering method of cleaning up the rear part of the chassis, as it eliminates the torque and radius rods which were so prominent several years ago. This is in keeping with the trend for simplicity and economy of upkeep as well as ease of manufacture. Reo, Packard, Oakland, Allen, Case, Elcar and Owen-Magnetic are the makers who have adopted this form of drive for this year's product.

In connection with better engine performance, thermostatic control of the cooling water is gaining in favor, as it makes possible a practical constant operating temperature for the engine and thus aids in handling the heavier fuels. Two applications of this control are noted, one in which the water flowing through the radiator is regulated and the other in which the amount of air passing through the radiator is controlled by thermostatically-regulated radiator shutters which vary the area of radiator surface exposed to the cooling effects of the air.

The fuel question is a most pertinent one, and practically every maker has some device to aid in vaporizing the heavier fuels. These devices consist of hot-spot manifolds, hot-waterjacketed manifolds in unit with thermostatic control, various applications of electric heaters and special forms of stoves to utilize the heat of the exhaust.



Unusual lamp design on Packard

Of course, the block cylinder casting is also an aid in this direction, as the incoming gases can absorb heat from the iron structure when passing through it.

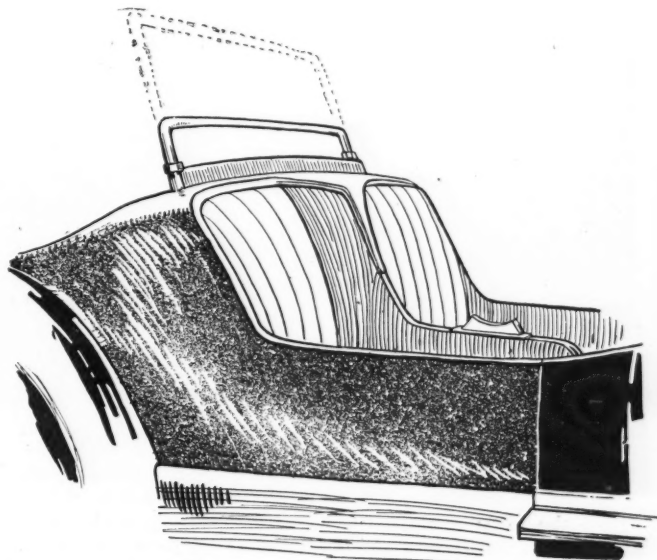
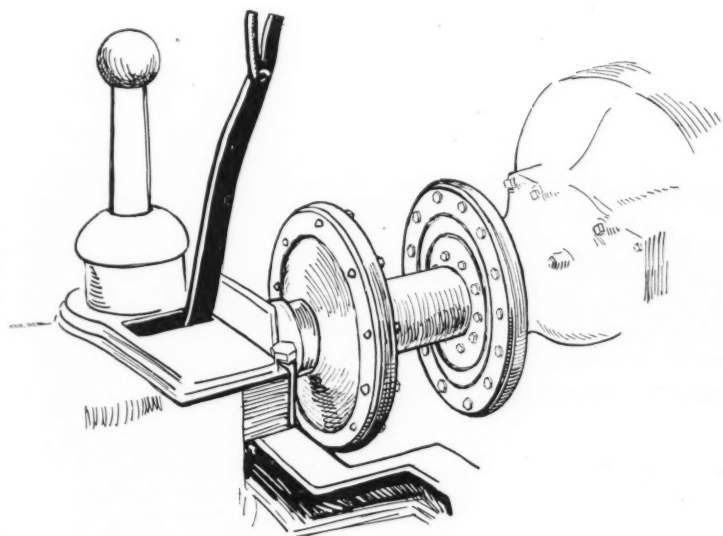
There is a growing need for some form of substantial lock for motor cars, and especially for those owners who reside in large cities where the possibilities of theft are greater. Marmon and Paige have developed a form of gearset lock which they have attached to this year's models and which are integral with the gearset.

SHIP BUILDERS ENLISTING

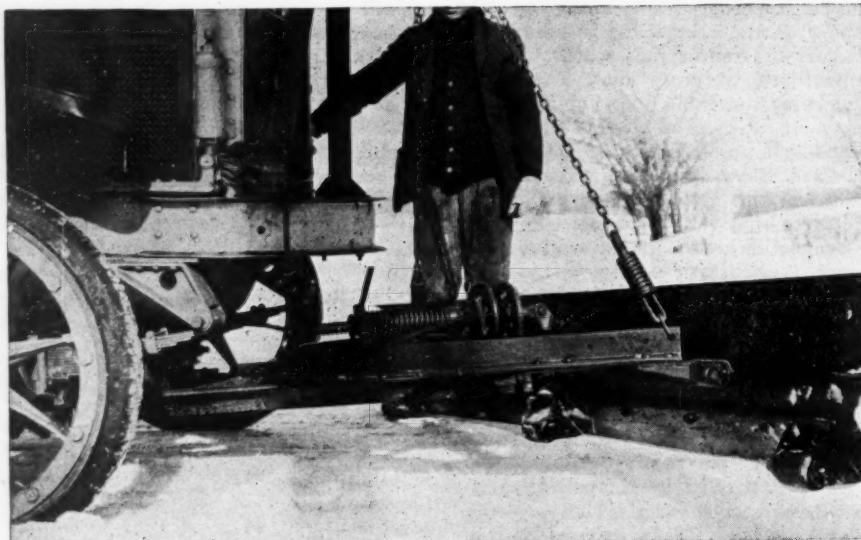
Washington, Feb. 4—Special telegram—The Department of Labor through its new employment reserve is enrolling thousands of workers from all parts of the country for the shipping board in anticipation of the great demand for workers in ship building during the next six months. An important result of the first week of this enrollment is that great numbers of those enrolling are men now out of work and seeking immediate employment, definite proof that there is no such labor shortage existing, as some agitators would have us believe. The department is insisting upon a sane course for handling of war time labor condition and has established several new bureaus to maintain a broad national labor policy.

WHERE "NON-ESSENTIAL" EXISTS

Washington, Feb. 4—Special telegram—Although Washington has dropped the word non-essential as applied to industries in war time, there are still a few departments that have not quite removed the word from their vocabulary. The word came up last week at a conference of state directors of the Public Service Reserve, which is a department in the Department of Labor and has to do with enrolling skilled workmen for different Government departments. These directors from the different states voted in favor of the conversion of non-essential industries rather than the establishment of new industries for those factories manufacturing war needs. This action really does not mean much so far as official Washington is concerned.



Mercer dry-disk clutch construction, left, and detail of baggage-carrying Templar touring roadster



HOW PENNSYLVANIA DOES IT

Close-up of a motor truck and plow used by the Pennsylvania state highway department to clear the roads for overland truck trains

How the plow operates. The construction is such that with the motive power furnished by the truck as pictured the snow is cleared

This is one of the state highway trucks that helped Pennsylvania make for itself a place unusual in road activities in keeping highways

Keeping the Roads



Pennsylvania road

WHEN that first convoy of twenty-seven trucks and several passenger cars successfully negotiated 900 miles of road, most of which was covered with snow and at a temperature below zero, and the seaboard was connected with the Mid-West, overland, a new era opened. Five such convoys have left Detroit since, each one day apart, and are motoring east to the seaboard. Soon, no doubt, we will learn that hundreds of convoys and thousands of trucks are on their way overland, driven by their own power and carrying vast tonnage of supplies.

The new era may mean that the highways of every section of the country will be developed and maintained and used constantly by trucks and passenger cars for passenger travel and for freight transportation.

The work of maintaining traffic on the winter highways, of keeping them free from snow to allow safe and speedy travel of the passenger cars and trucks, has been no small job. New schemes, new methods, new appliances, all had to be arranged and used. W. D. Uhler, chief engineer of the Pennsylvania state highway system, worked out the plan by which Pennsylvania so efficiently kept open its highways for the first truck convoy and which easily might serve as guide to other states. The department was constantly alert. It arranged with the weather bureau at Pittsburgh so that it was, and is, kept informed at all times as to weather conditions and approaching storms.

As soon as word was received of the approach of a storm the maintenance division sent immediate notices to the various district engineers through whose districts the state highway passed, and they in turn arranged to have their men and equipment ready so that no time was lost in fighting the storm. They worked on the basis that the most efficient and economical work could be done by fighting the snow rather

Clear for Traffic



cleared by trucks

than waiting until after the snow had fallen. As soon as the snow reached a depth of 2 in. and indications pointed to a continuance of the storm, snow plows, consisting of motor trucks fitted with wooden boards arranged on rollers to act as plows, and motive trucks pulling standard road machines and road machines pulled by horses were placed at work. In some cases road drags were used and found advantageous. In the case of heavy drifts it was necessary to send drags drawn by horses through to break a track to enable the motor plows to work, while in extremely heavy drifts work by hand and shovel was necessary. In all cases where it was possible to do so, machinery was used. The army of plows, road machines, drags, labor, etc., was entirely dependent upon the extent of the storms, as to its size. Where necessary both day and night shifts were used.

The Pennsylvania department, which undoubtedly has provided the War Department with the most efficient highway service during these extremely severe winter months, now is working day and night to keep open every highway for the movement of United States Army trucks and is operating nine motor trucks equipped with snow plows, fifty road machines and many motor trucks. Other state highways well may observe the method and work of the Pennsylvania department and adopt some of its plans, for it has up to this time been a state that has co-operated in every way with the Government to make the passage of the Army truck trains overland successful.

Sooner or later the use of all highways, both for war and commercial purposes, is certain to come. State highway officials with vision able to peer into the future, naturally will realize the opportunity that lies in immediate development and constant maintenance of the highways under their jurisdiction.



PROVING IT CAN BE DONE

This road was made open to the passage of motor vehicles by the use of motor trucks and machines with wooden plows

How a road in this kind of weather can be made to give way to the passage of motor cars and trucks through the proper treatment

Motor trucks with snow plows attached can be used to clear the highways of a state as here and must be for the overland drives

Class AA War Trucks

First Four Practically Complete—Designed Under Supervision of Quartermaster Corps and for Use by Navy, Marine, Signal and Medical Corps and Postoffice

WASHINGTON, Feb. 4—The first four experimental models of the class AA $\frac{3}{4}$ -ton trucks are practically complete. Designed under the supervision of the Quartermaster Corps, they are destined to play perhaps the greatest part in all the work of our standardized war vehicles for the reason that they will be purchased in great numbers and probably will be used not only by the Quartermaster Corps but also for the Navy Department, Marine, Signal and Medical Corps and also for the Postoffice Department. All these departments were considered in the design of the truck, which as far as possible includes provision for the particular class of work which must be performed by each of the departments named. Although the Quartermaster Corps will use a large number of the trucks as soon as they pass through the preliminary road tests, it is expected the Medical Corps will require at least 3500 for immediate service as ambulances. It is likely several thousand also will be purchased this year for service over the 4000 miles of new parcel post routes just laid out by the Postoffice Department from Maine to Louisiana.

Ambulance Needs Have Effect

The fact that the chassis will serve as an ambulance perhaps affected its design to a greater extent than any other department. It was because of this use that the vehicle was provided with a torque arm and radius rods notwithstanding the heavier class A and class B trucks both employ Hotchkiss final drive, in which the torque and propulsion are taken by the rear springs. Ambulance work demands easy riding qualities, and it was considered advisable for this service to make the springs carry only the body and the live load instead of both the driving and propulsive strains. The use of the radius rods and torque arm make for a slightly heavier and more costly construction, but where the lives of our men are in the balance these two elements are secondary in consideration. These de-

tails, however, have not been finally settled.

As previously told in MOTOR AGE the trucks were assembled by the Reo Motor Car Co., Lansing, Mich., Federal Motor Truck Co., Detroit, Maxwell Motor Car Co., Detroit, and Willys-Overland Co., Toledo, Ohio. The fifth truck, which will be assembled later in Washington as a check against the design, has not been started.

The progress of the work at the four plants was about the same. The vehicles originally were scheduled for completion Jan. 15, but this was not possible on account of various unavoidable delays.

The Federal and Reo companies received their orders from the Government to begin construction Dec. 19, 1917, while Willys-Overland received its order Dec. 24, and the Maxwell, the last to receive word to go ahead, secured its order Jan. 7.

The Federal company received the engine, springs, frame and clutch Jan. 2 and immediately commenced assembling the various component parts. With the exception of the front and rear axles, its job virtually was completed Jan. 8. The Reo company went to work on much the same schedule and completed its truck as far as possible at the same time.

The Willys-Overland Co. received its engine from the Northway Motor Corp. Jan. 3, together with the frame parts from the Reo company and the clutch assembly from the Detroit Gear & Machine Co. The steering assembly arrived the following day and the Willard storage battery and muffler, Jan. 8. The wood wheels, transmission and radiator, the latter from the Federal Motor Truck Co., arrived Jan. 10. The starting motor, fenders, hood, tool box and universal joints arrived Jan. 11, and the dash instrument board and fittings Jan. 15. Actual assembly began Jan. 16 and was finished as far as possible Jan. 24 with the exception of front and rear axles. The Maxwell company started its assembly

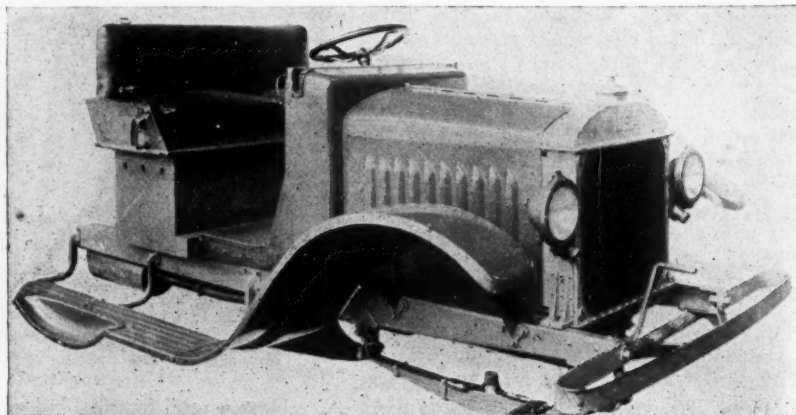
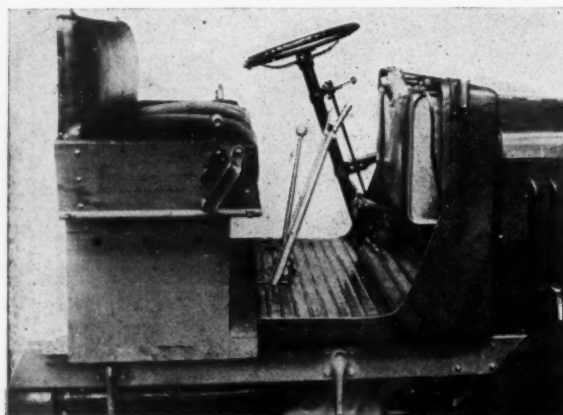
Jan. 11, the day on which the frame arrived, and finished the vehicle Jan. 24 with the exception of both sets of axles. The delay in delivery of axles was due to the fact that they required much new die work.

All the principal component parts entering into the construction of the truck were ordered from parts makers by the Government, which, therefore, was responsible for arrival of parts at the assembly plants on schedule time.

The mechanical features of the truck already have been explained in detail in these columns but are illustrated further in the accompanying photographs. It will be noticed that the engine is provided with detachable-head cylinders and with the dual ignition consisting of both a magneto and generator as on the class A and class B trucks. It differs from both of the latter in that it is equipped with an electric starter. It has, however, many of the characteristics of the class A and B engines including the hot-spot manifold and a similar mounting of the distributor, water pump and magneto on the left side of the engine looking toward the front and the governor and generator on the right side.

Cylinders Are Interchangeable

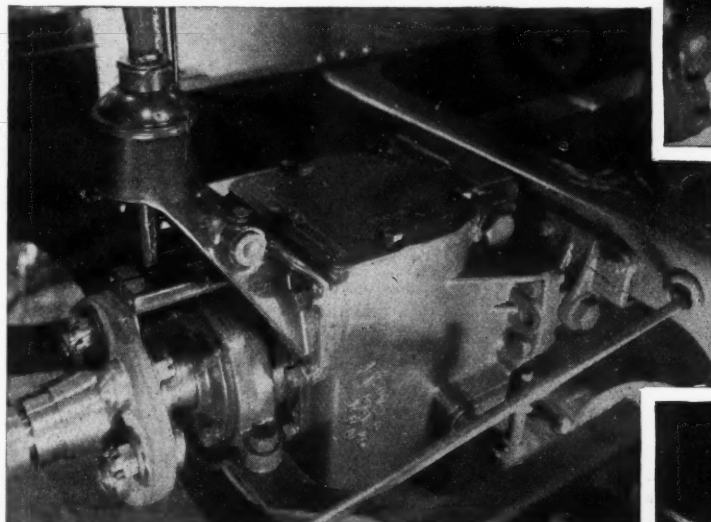
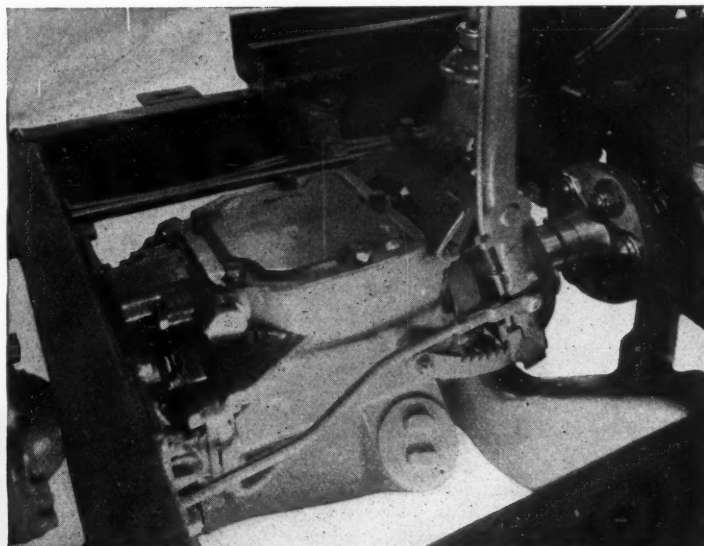
Another unusual feature of the engine is that the crankcase is so designed that cylinders of $3\frac{3}{4}$ by 5-in. bore and stroke are interchangeable with the 4 by 5 in. cylinders now fitted. The purpose of this construction is to enable the Postoffice Department to use a slightly smaller engine as the 42 hp. of the 4 by 5 cylinders is considered too large for ordinary Postoffice work. It may be said in this connection that the undefined rumors to the effect that the Postoffice Department will not use any of the standardized war trucks certainly does not apply to the class AA job, since Postoffice officials and engineers were considered in the design and their recommendations incorporated into the construction.



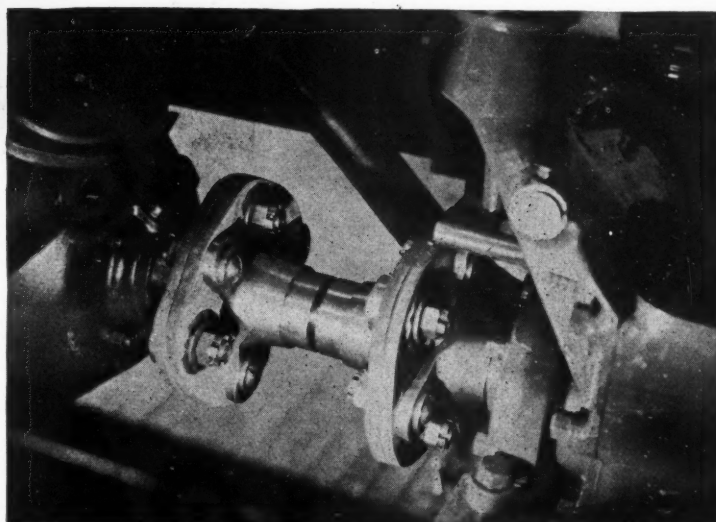
Arrangement of steering gear and control levers. The position of the gasoline tank is shown also, with the large filler cap. On the right, three-quarter view of the Maxwell job awaiting the receipt of the front and rear axles

At right—Right side of the gearset housing, showing the large filler plug and the method of mounting the brake lever on a special bracket on the cover so that it can be removed easily for removing the gearbox

Below—The unusual three-point support of the gearset with the trunnion type bearing on the front and the two semi-universal-like supports at the rear

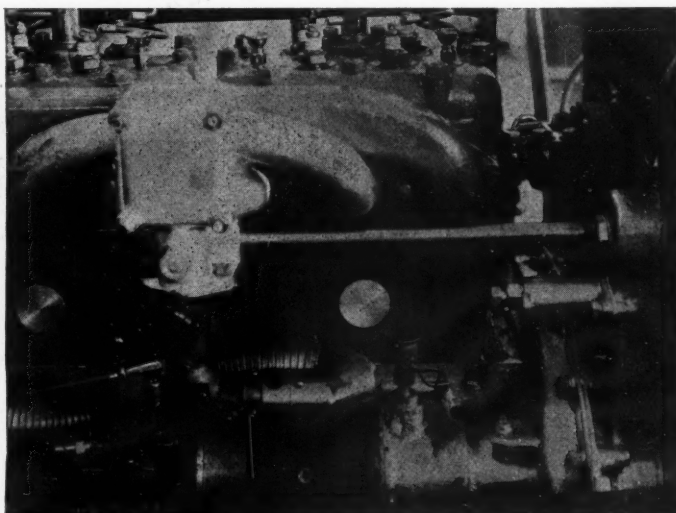
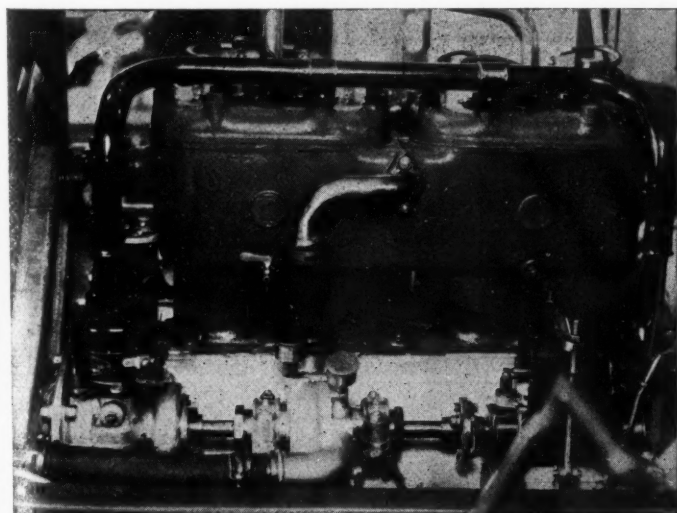


Below—Plan view of the method of taking the drive from the clutch to the gearset by means of two Ther-moid fabric universal joints. Note the amidship positioning of the gearset which makes it easy to remove it for any reason without disturbing the clutch.



Below, at right—Left side of the engine, showing hot-spot manifold, Stromberg carbureter and hot-air pipe leading from exhaust pipe under the fuel tank on the dash. The starter is shown to the extreme left, the Westinghouse generator in the center and the governor at the left

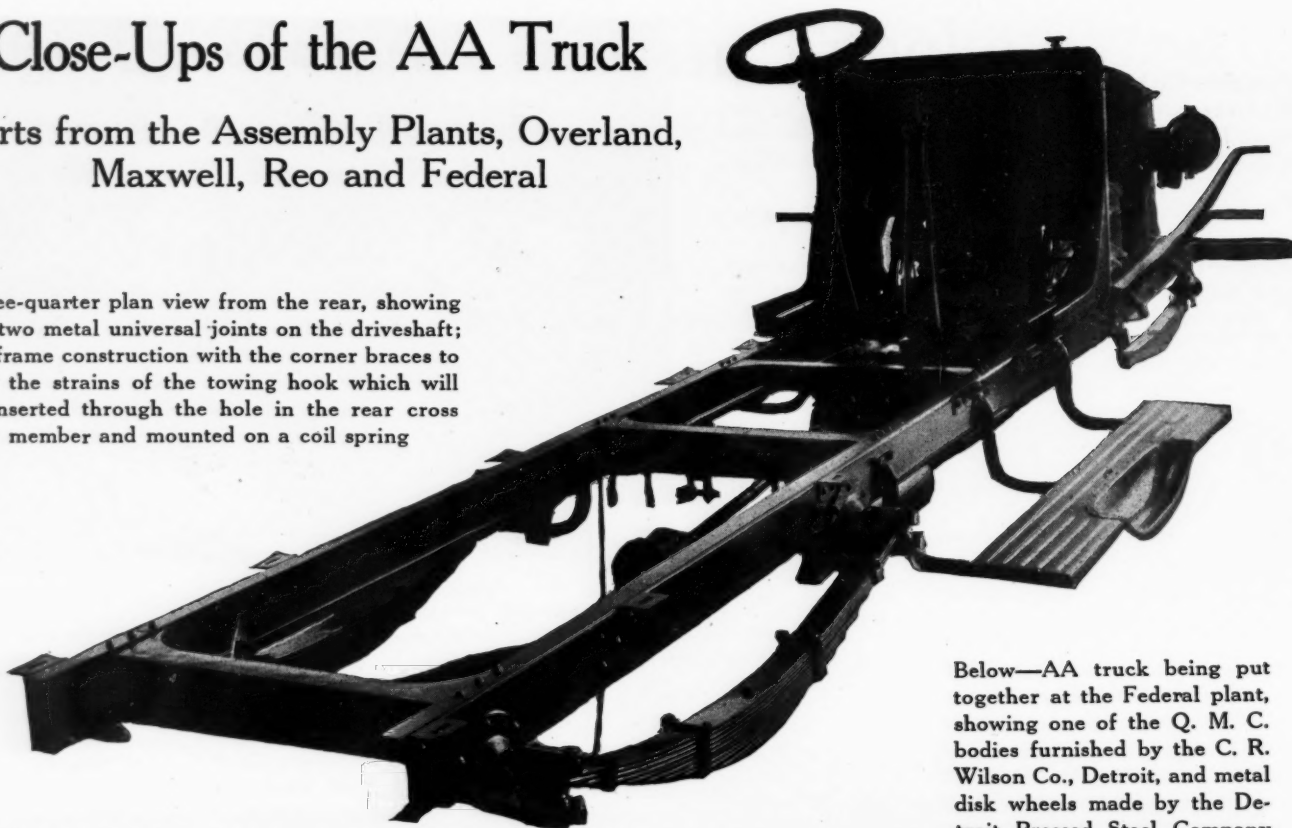
Below at left—Right side of engine, showing Remy distributor, water pump and Bosch magneto on the same longitudinal shaft



Close-Ups of the AA Truck

Parts from the Assembly Plants, Overland,
Maxwell, Reo and Federal

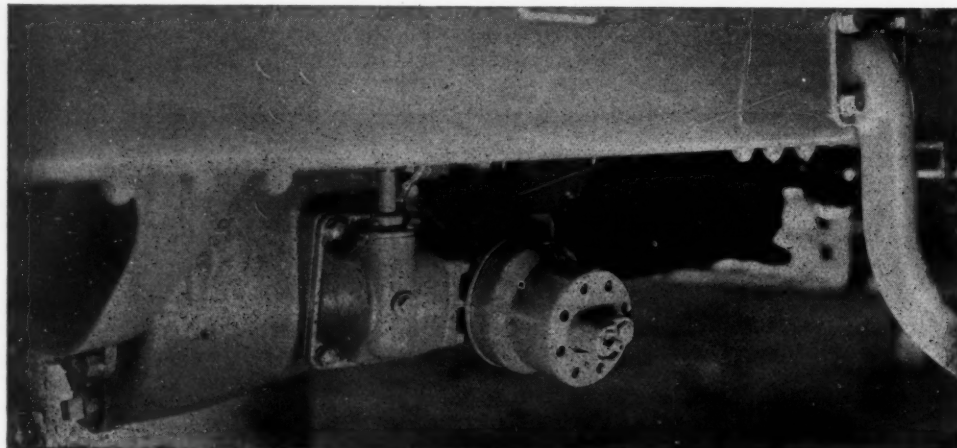
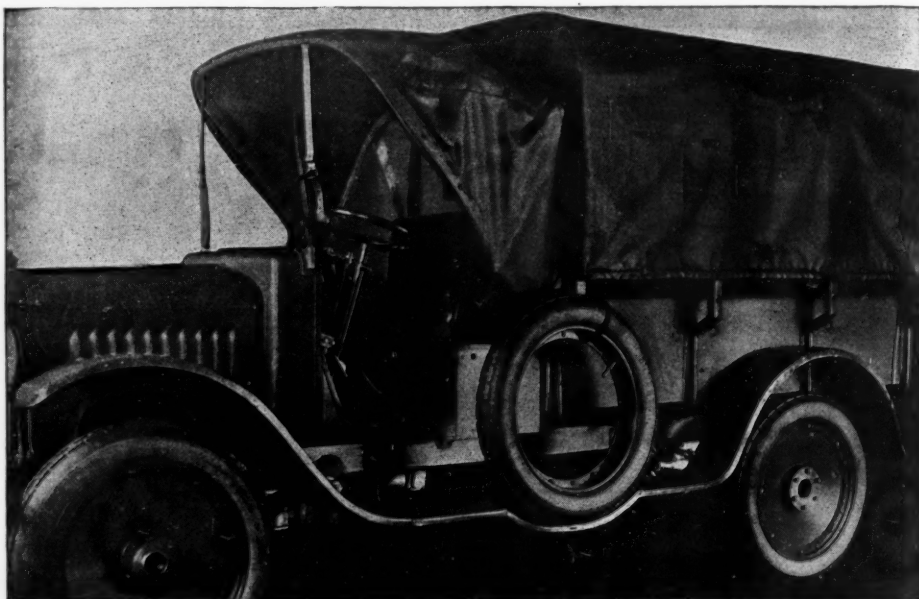
Three-quarter plan view from the rear, showing the two metal universal joints on the driveshaft; the frame construction with the corner braces to take the strains of the towing hook which will be inserted through the hole in the rear cross member and mounted on a coil spring



Below—AA truck being put together at the Federal plant, showing one of the Q. M. C. bodies furnished by the C. R. Wilson Co., Detroit, and metal disk wheels made by the Detroit Pressed Steel Company

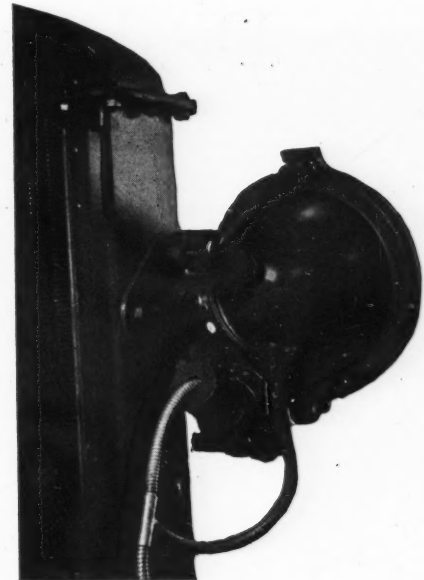
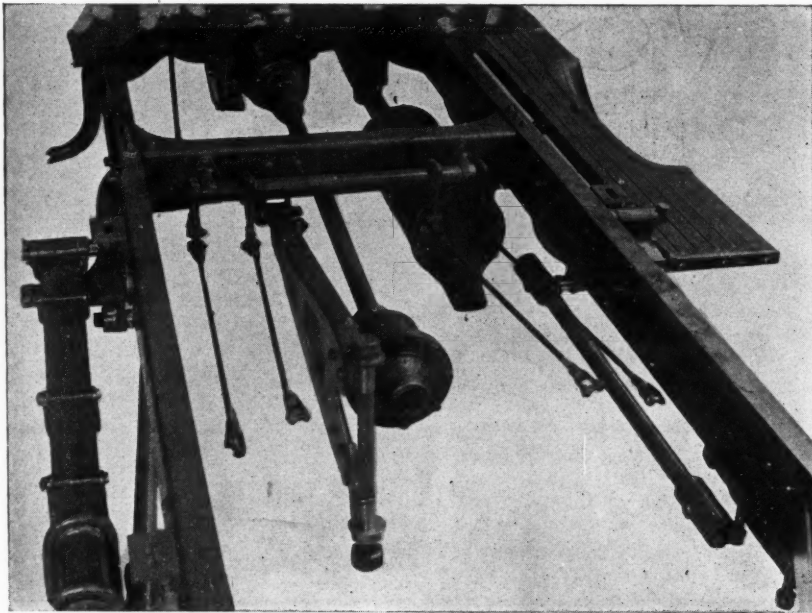
Aside from the large component parts shipped to each assembler by the parts concerns, each assembler furnished a large number of small units such as the brake rod assembly, clutch pedal assembly, fabric universal joint spiders, spring bolts and the like. The Willys-Overland Co. furnished 130 extra parts in all, including spring bolts, pads, clutch and brake pedal units, bumper, drawbar, etc., exclusive of the wiring systems. The Maxwell company supplied a large number of forgings and the spring hangers. Each assembler himself provided small brackets, the spark and control assemblies and a thousand and one small parts which go to make up the completed vehicle.

According to plans at this time the trucks will be driven overland to Washington. The Reo job has a Q. M. C. body made by the Auto Body Co., Lansing, Mich., and the Federal job a body made by the C. R. Wilson Co., Detroit. It is expected that the vehicles will undergo tests similar to those given class A and class B trucks, upon arrival at Washington and as soon as



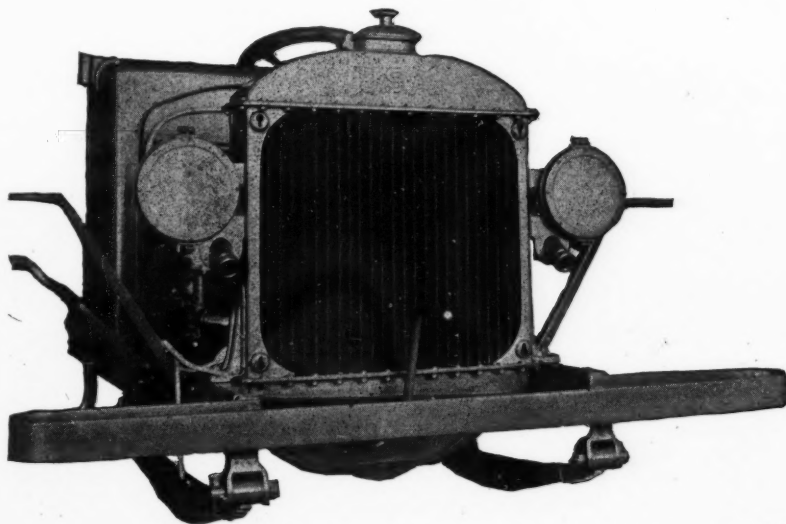
Gearset from the left side of the truck, looking toward the front and showing the Stewart tire pump fitted so that deflated tires can be pumped up on the road immediately after being repaired if punctured

found satisfactory will be ordered in large quantities. The AA truck can be made in great quantities and an indication of the production which can be had with these trucks is in the statement of Walter E. Flanders of the Maxwell company, who volunteered the information that his company could build 100 of these trucks a day when given the requisite parts.

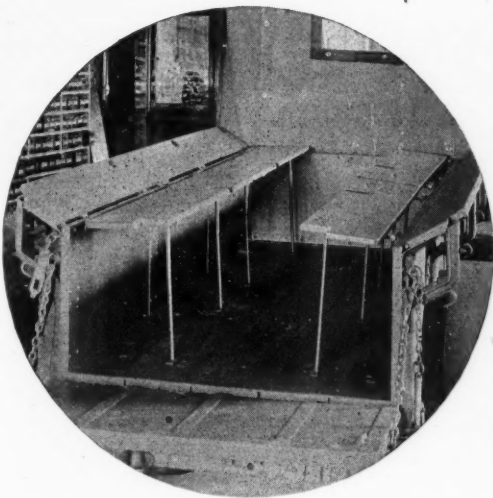


Upper right—Rear view of the combination headlight and shaving-stick night driving light mounted on the side of the pressed steel radiator casing of the Overland job

Upper left—Rear view of the AA truck being assembled at the Maxwell plant, showing pressed steel torque arm and driveshaft aft of the gearset with the two metal universal joints



Left—Three-quarter front view, showing the vertical finned tube radiator with its pressed-steel top and bottom tanks and the spring-bolt oil reservoirs

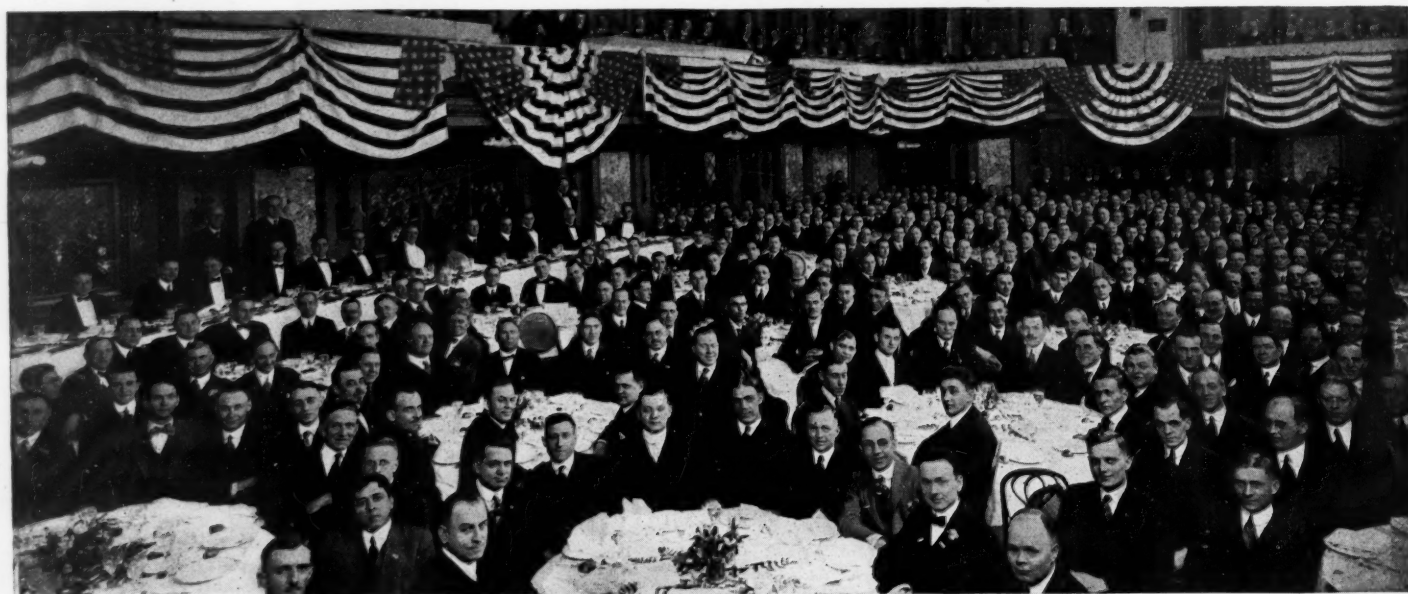


Rear views of the Q. M. C. body mounted on the Reo job, with circle showing the hinged seats which fold back on the flareboards. Note also the pressed steel braces on the body sides and the hooks for the tarpaulin top. Six men can ride on each side, the seats being in two parts

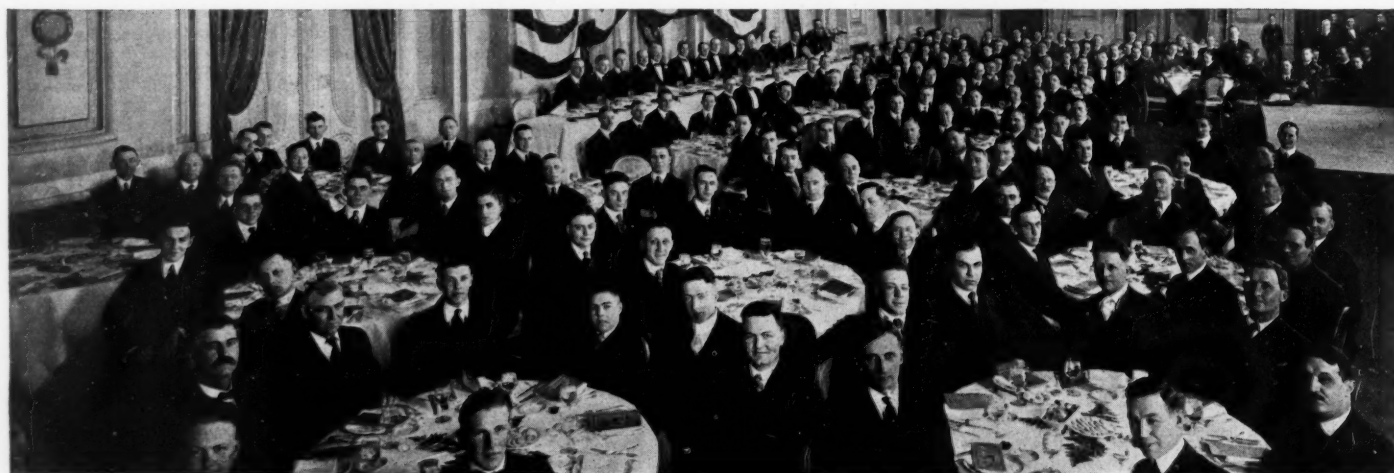


Dealer Banquets at Chicago

During Show Week



Gathering at the Maxwell-Chalmers dinner, Jan. 31, at Congress Hotel

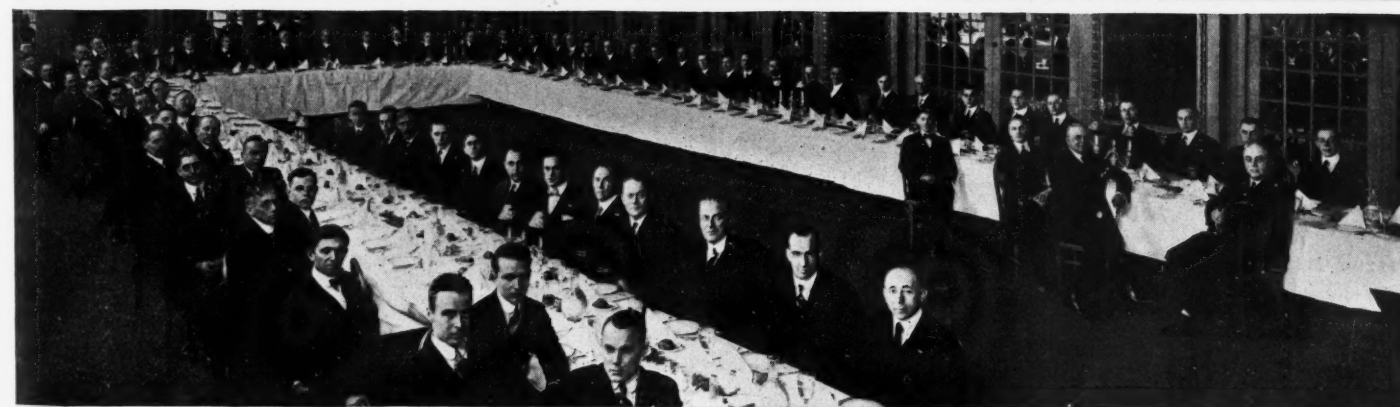
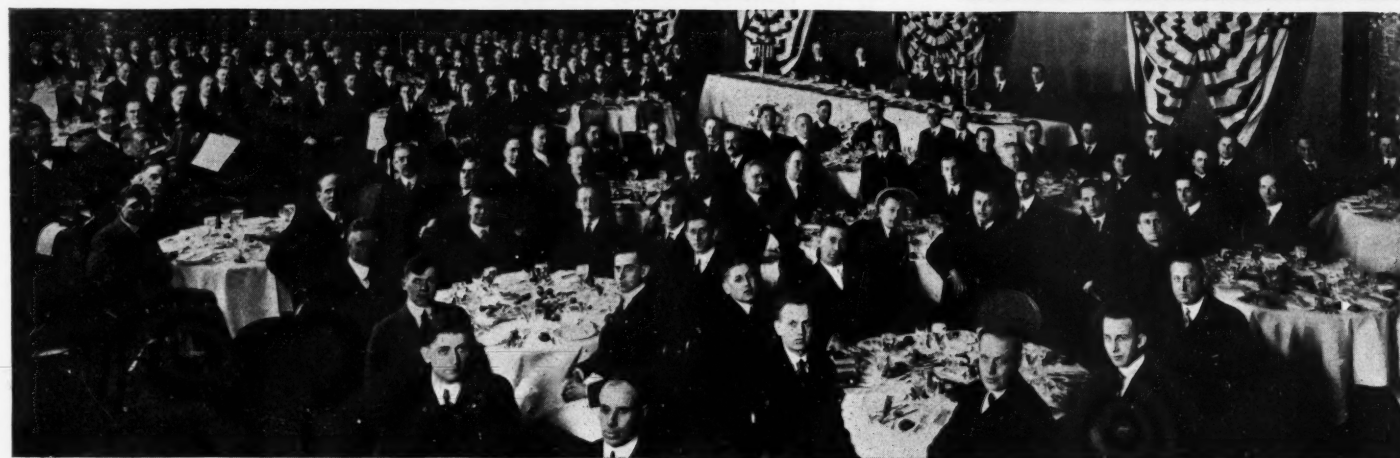
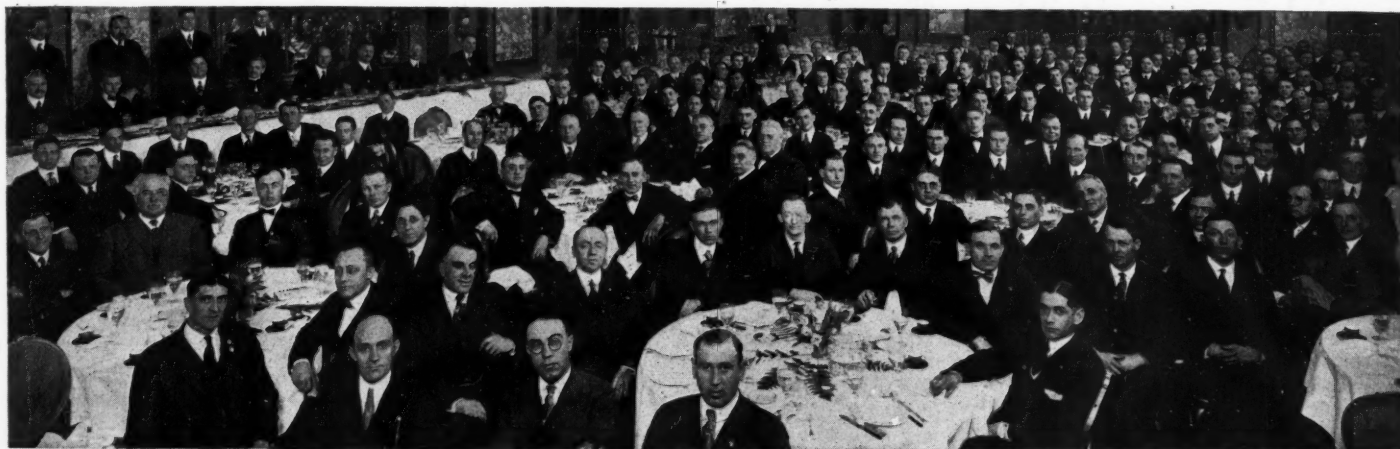


Scene when Paige dealers held their banquet at Hotel La Salle, Jan. 31



Luncheon of Franklin dealers, which was held at Congress Hotel, Jan. 31

—Photos on this page by Kaufmann & Fabry Co.



—Photos by Kaufmann & Fabry Co.

Reading from top to bottom, the pictures are of the Reo luncheon for its dealers, held at Congress Hotel, Jan. 31; annual Oldsmobile banquet, Congress Hotel, Jan. 30; second annual Elgin banquet for dealers, Hotel Sherman, Jan. 31, and Velie luncheon at Hotel Sherman, Jan. 30

Special Tractor Building

Kansas City Erects Exhibition House for Third Annual National Show

Southwest Indicates Spring Delivery of 4000 Farm Orders

KANSAS CITY, Mo., Feb. 1.—The tractor show to be held here Feb. 11-16 will be housed in a special building, now being erected. The plans have had to be increased twice on account of the avalanche of space demands, and the completed plans call for nearly 75,000 sq. ft. of floor space, an increase from a contemplated 30,000 sq. ft. The unusual labor conditions affecting all farm operations have had much to do in creating the unusual interest which has changed the small tent show of the former annual national tractor shows into a big exhibition requiring a special building and exerting universal influence.

This is the third annual national tractor exhibition, and a record-breaking crowd is expected. Ninety-five per cent of the tractor makers will be represented. Dealers from as far east as New York and as far west as California will be here. Thousands of farmers from eight states, Missouri, Kansas, Illinois, Arkansas, Colorado, Texas, Iowa and Nebraska, will attend, as well as many from farther points. Speakers of authority on tractors will address the visitors, and representatives of the French government are coming to see what improvements have been developed by American tractor makers. The French have used thousands of American tractors during the last years and are wideawake to the possibilities of the tractor as a war economic factor in the production of food stuffs now when farm labor is not available in sufficient numbers.

Tractor Interest Grows

Thousands of American-made tractors are being used in France, as well as England, Belgium and other European countries. Fifteen hundred more are expected to be in France in time for spring plowing, while Great Britain already has contracted for more than 6000 additional American tractors. And the knowledge of all this is adding to the interest attached to the huge building going up on Union Station Plaza, where more than a quarter million persons are awaited for this year's tractor show.

The five states Kansas, Oklahoma, Colorado, Missouri and Arkansas will take 4000 tractors for delivery for spring work this year, according to estimates made by C. S. Roth of the tractor department of the Emerson-Brantingham company in the Kansas City territory. Colorado already has purchased 1000 tractors for spring delivery and may purchase more than any other state this year. Kansas has 4000 tractors in use now and probably will buy 1000 more this season. Oklahoma probably will take 1000 tractors for 1918 spring delivery, and Missouri and Arkansas will utilize another 1000.

The buying power of the farmers of these states is such this year that they

are amply able to take tractors even at advanced prices, Mr. Roth states, and the scarcity of farm labor and man power is causing many early orders to be placed. The farm tractor is coming into its own in Missouri in particular, though the average farm is a small one compared with the Northwest or West and the big tractors have proved profitable only in exceptional cases. Missouri has 1000 tractors in use, it is estimated, most of which were bought during the last year.

Louisiana, Arkansas and Southern Missouri, virtually unworked states as far as tractor sales are concerned, are exhibiting a keen demand for tractors, particularly for road work, according to R. B. Powers, manager of the Aultman-Taylor Machinery Co., who has just made an extensive tour of the territory. Money was never so plentiful as in these sections now, and the farmers have the same labor problems as other sections of the great central-western agricultural belt. This problem has been aggravated by the exodus of negro farm labor to the North from Louisiana and Arkansas especially.

The need for tractors now as never before can be appreciated readily when one considers the statement made by the secretary of the American Percheron Society at Manhattan, Kan., recently. This statement was to the effect that only 1,000,000 horses capable of war work are left in the United States and that America is plagued with about 15,000,000 small horses that are not fitted for the task before them because of their small size and that are not wanted by the Government for the same reason. At the same time it was urged that the use of tractors be enlarged this spring to save the large farm horses.

CALIFORNIA REGISTERS 306,247 CARS

Los Angeles, Feb. 1.—California registered 306,247 cars in 1917, a gain over 1916 of approximately 70,000, or 31 per cent. This is the largest increase in registrations in the history of the state motor vehicle department. Los Angeles led all counties in the state with a gain of 21,327 and now has practically 97,000 registered cars within its precincts. This is more cars than were in thirty-three states of the union according to reports last July.

Motor car sales did not slump following the declaration of war by the United States and it began to appear as if the example of Canada, where sales have gained materially, would be emulated here. Since the dawn of 1918, though, there has come a change. January business was slow, slower than January, 1917, and dealers are beginning to feel apprehensive for the future. Owing to shipping conditions, it has been impossible for one or two dealers to supply the demand but two weeks of normal conditions would put cars on hand. It is expected now that factories in the east will begin crowding the dealers here with deliveries soon. One big producer already has sent a trainload of cars to this point and all have gone into warehouses, because dealers would not take them up. In the effort to bring about business stimulation, it has been proposed to hold salesmen's conventions to be attended compulsorily by every salesman in the city, where there would be an interchange of plans and ideas.

Farmers See Tractor Show

Eighty Per Cent of Total Attendance at Oklahoma City Exhibit

Purchases Eclipse Those by Dealers, Which Were Unusual

OKLAHOMA CITY, Okla., Feb. 1.—An unprecedented demand for tractors has arisen during the last six months in the Southwest, and the states of this section were well represented at the tractor show which closed here the 26th. The attendance figures show that 80 per cent of the crowd was made up of farmers from Oklahoma, Texas and Arkansas, an extraordinarily large percentage of farmers over dealers. In addition sales to dealers were beyond the expectations of the exhibitors, while the dealer sales were eclipsed by sales to farmers direct.

The same clamor for tractors with which to conserve man power and bring about increased production that prevails in the corn belt affects the grass and wheat belts of the Southwest. Crop prospects have taken on a roseate hue since the unusual snowfall in Oklahoma, parts of Texas and Arkansas and the good rains in the remaining sections.

Twenty tractor makers and one tractor attachment manufacturer exhibited in the Emerson-Brantingham Implement Co. building, using two entire floors. It had been planned to hold the show near the Coliseum, where the passenger car was held, but the tent which was to be used failed to arrive and the plans had to be changed two days before the opening. Each exhibit averaged three models and sizes, and the display of tools adaptable to use with tractors was an extremely large and attractive feature of the exhibition. Oklahoma, Texas and Arkansas motor car dealers who can get tractor agencies are hurrying to do so to meet the demand.

THIRTY TRACTORS TO A COUNTY

Manhattan, Kan., Feb. 1.—Among the thousands who gathered at the Kansas State Agricultural College here for Farm and Home Week were many tractor dealers who came to feel out the pulse of the farmers of the state and to see what the tractor demonstrations and lectures given by the engineering and farm machinery department brought out. One tractor expert estimates that the average number of tractors to a Kansas county now is thirty and that purchasers this year will bring that up to forty.

Many farmers who had moved to the towns and cities of the state to take life easy, leaving their farms in the care of renters or tenants, are going back to the farms this spring. All these naturally have watched with keen interest the progress made in tractors, and if they do not already have tractors on their farms they will turn to them at once, dealers who looked the situation over closely predict.

Tractor dealers, particularly those who have motor truck and passenger car lines in connection with their tractor sales, are

trying to find a way out of the problem of labor for repair and service branches of their business.

Co-operative deliveries of merchandise in the cities and towns of the state will release many motor truck and motor car drivers to the garages and tractor motor car and motor truck dealers, as these boys and young men, most of them under draft age will prefer to keep in touch with motors rather than to engage in more arduous work, tractor men, motor car and motor truck dealers say. If this is true the problem of labor for the tractor and garage and motor car dealers out in the state will be solved partially at least.

DART TRUCKS COST MORE

Waterloo, Iowa, Feb. 4.—The Dart Motor Truck Co. has increased the price of its 2-ton model from \$2,470 to \$2,650 and its 3½-ton from \$3,400 to \$3,600. The price of the 1-ton remains \$1,850.

MASON SALE GAIN SEVENFOLD

Kent, Ohio, Feb. 2.—Sales of the Mason Tire & Rubber Co. for the first quarter of the 1918 fiscal year show an increase of 700 per cent over the same quarter of 1917. January sales were the largest in the history of the company for any one month.

Third Largest Car Owner

Canada Now Claims Place with Conservative Estimate of 150,000 Machines

U. S. Made All but Five Imported in 1917

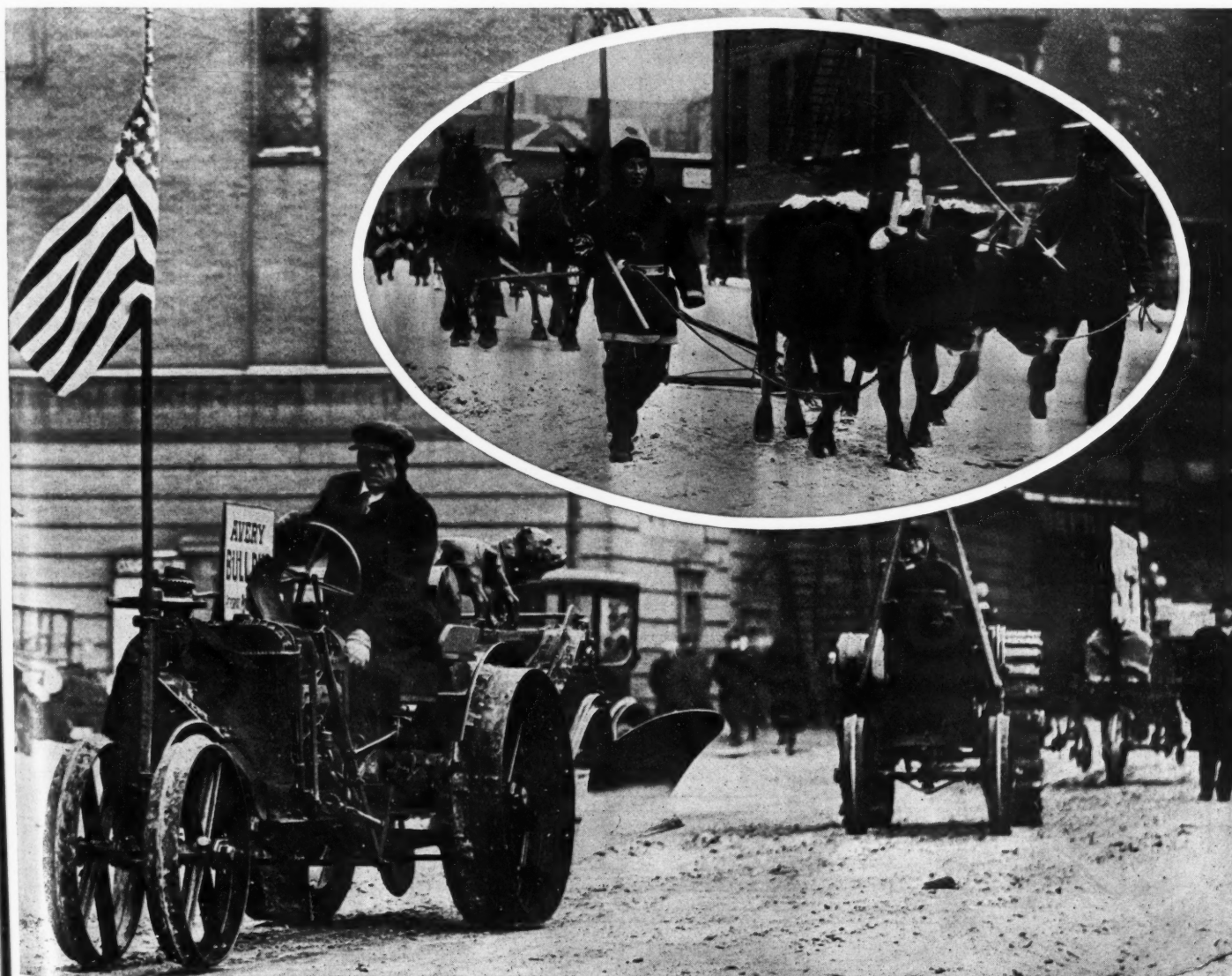
MONTREAL, Can., Feb. 1.—The prosperity of Canada, particularly in the west, together with the adoption of the motor car as a necessity for efficient farming, is shown by the number of cars in the Dominion of Canada, which places her third in the list of the world's largest car owners. In 1915 Canada imported approximately \$7,000,000 worth of motor vehicles and parts; in 1916 over \$9,500,000, and in 1917, nearly \$15,800,000.

A conservative estimate places cars already owned in Canada at more than 150,000. Ontario, with a population of slightly more than 2,500,000, is using 75,000, or one to every thirty-three persons. The same ratio obtains in the city of Toronto, one to every seven or eight families. Canada as

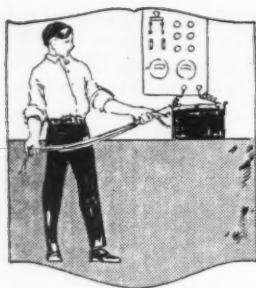
a whole has one car for every fifty-seven persons. In all, 7346 passenger cars, valued at \$4,712,433, were imported into Canada during the first six months of 1917. All but five came from the United States. During the same period, 138 commercial cars, valued at \$184,107, entered Canada. Imports of parts were \$3,184,838. It is estimated that Canada will purchase 100,000 cars this year, an increase of 85 per cent over pre-war buying.

The province of Ontario, which has been experimenting rather extensively with government-owned and operated farm tractors to increase production, now owns ninety-five farm tractors engaged before the freezeup in plowing in many districts. The government charges the farmer 45 cents an hour in addition to the cost of gasoline and oil and the board of the tractor engineer. In case of rain the farmer continues to board the tractor operator until the work for which the machine was hired from the government is finished.

It is estimated that Canadian motorists in the three prairie provinces will part with \$12,373,000 during 1918 for accessories, including tires, an increase of \$5,100,000 over the sum paid out last year by the motoring public. About \$6,311,000 will be spent for tires alone, it is expected.

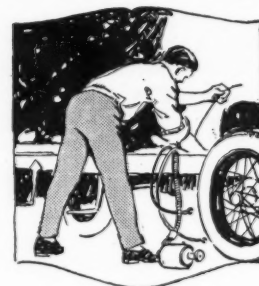


Tractor parade for the Twin-City exhibition, Feb. 2-9, included the oxen in the insert, specially trained for the occasion



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the eighty-first installment of a weekly series of articles begun in MOTOR AGE. issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York, in a size to fit the pocket conveniently.

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout. Electric motors and engine and motor connections then were considered. Ignition was taken up next.

Part LXXXI—Special Electrical Systems for Ford Car Continued

AT a point on the dash 2 in. to the right of the coil box and 6 in. above the edge of the toe board, drill a $\frac{3}{8}$ -inch hole, as at 1 in Fig. 446. Pass the upper rod through this hole and connect the lever arm 2 vertically to the forward exhaust manifold stud. Connect the lower rod 3 to the priming lever on the carbureter. Work the rods back and forth several times to make sure they return to normal position when released.

Installation of Battery

Place the battery box on the right-hand running board and mark four holes with a center punch as shown at 1 in Fig. 447. The position of the battery box should be such as to permit easy opening of the car doors and ready access to the box itself. Drill four $\frac{1}{2}$ -inch holes through the running board 2, using a jack or prop to support the running board while drilling. Replace the battery box on running board to mark the holes in the splash plate for insulating cable bushings 3, then drill two holes $1\frac{3}{8}$

inch in diameter. Insert the insulating cable bushing 4 in left-hand hole and secure it in place with wooden nut; do the same with the right-hand bushing 5. The wooden nuts may be secured in position by twisting a piece of wire around the thread as shown at 6. A coat of heavy paint also will serve to hold the nut in place and at the same time preserve the insulator. Place the two wooden cleats 7 with holes in each end between the battery box and the running board. Bolt the battery box to the running board with $\frac{3}{8}$ -inch by $1\frac{1}{2}$ -inch bolts through the bottom of the battery box, cleats and running board, and secure the four bolts with nuts and lock washers. Place the two special battery cleats 9 inside the battery box, one at each end, for the battery to rest upon so that the holes in the cleats will fit over the bolt heads in the bottom of the box. Slide the battery in place with the negative terminal of the battery toward the front of the car and put $\frac{1}{4}$ -inch wooden strips 10 at each side between the battery and the box. Attach the two holddown springs 11 so as to hold the battery

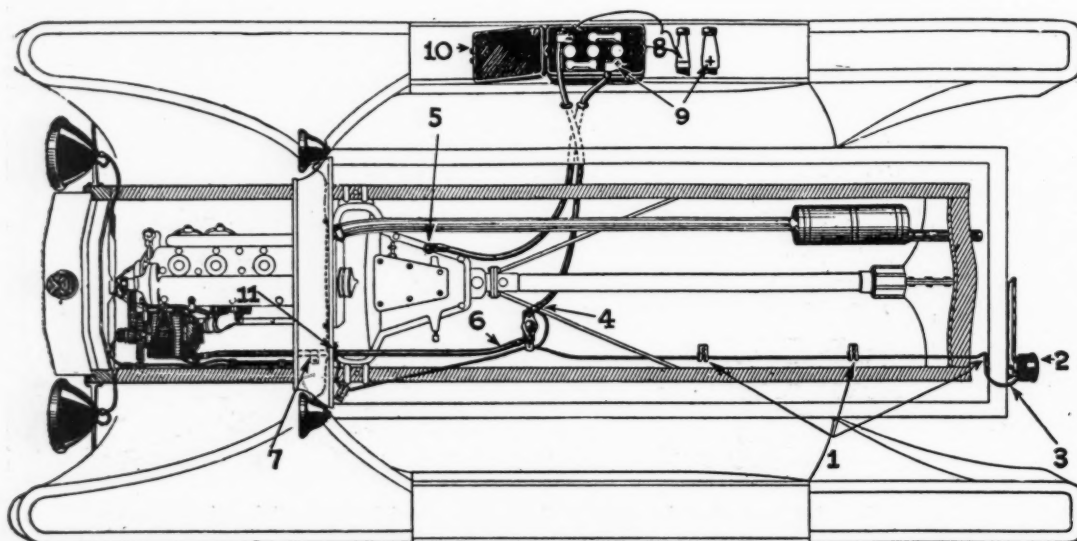
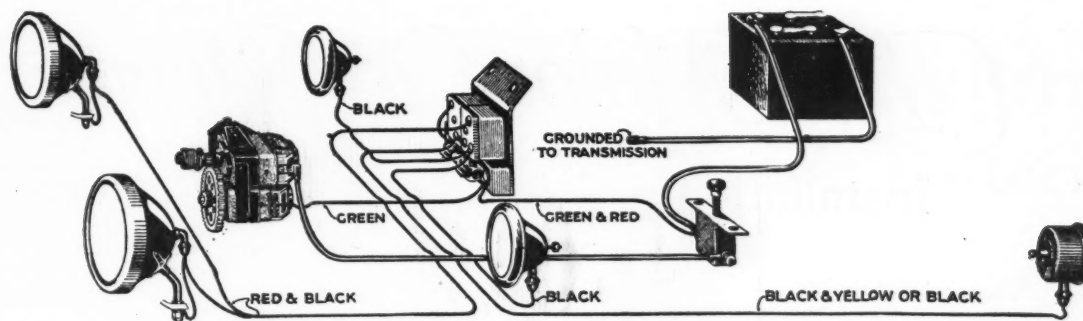


Fig. 448—Wiring diagram of the internal connection of the Gray & Davis third-brush generator

Fig. 449—Perspective of Gray & Davis electric system installed on a Ford



securely in place. Examine the battery and if the solution does not cover the plates at least $\frac{1}{4}$ inch, add pure water, filling the cells to $\frac{5}{8}$ inch above the tops of the plates.

Connecting the Wiring

The entire system in place is shown in Fig. 448 and the wiring in plan and perspective are shown in plan and perspective in Figs. 449 and 450, respectively. Attach the three clips holding the tail-lamp wire as shown at 1 in Fig. 448. Place the tail lamp in position as shown at 2, and connect the tail-light wire 3 to the tail lamp. Tail lamps usually are made with a single-wire connector, and in such cases the metal body of the lamp must be connected metallically with the frame of the car. Be sure that the connecting surfaces are clean, free from paint and securely fastened. If the lamp is provided with a two-wire connector, another wire should be run from the second terminal of the connector to the metal framework of the car. Connect the short battery cable and the green and red wire to the starting switch terminal on the side nearest the center of the car, as shown at 4. Then pass the end of the cable through the forward insulator in the splash plate. This is the negative cable. Connect the long battery cable to the second gearbox bolt and secure it with a plain lock washer as shown at 5 in the figure, and pass the end of the cable through the rear insulator in the splash plate. Make as good an electrical connection to the gearbox as possible. This is the positive cable. Connect the starting motor cable 6 to the outside terminal of the starting switch. Support the starting motor cable by a clip 7 to the inside curved edge of the dash. Pass the negative battery cable through the battery box insulator and connect it to the negative battery terminal, 8.

The battery terminals are made of lead and should be handled carefully. In connecting the cables to the battery terminals, be sure that the terminals are cleaned thoroughly and fastened securely, as a good firm contact must be made to offer as low a resistance as possible. The positive battery cable terminal is a little larger than the negative one, and they correspond in size to the holes in the lugs forming the terminals of the battery. The positive battery cable terminal should not be connected to the battery or the fuses inserted until tests show that the wires are not in contact with the frame of the car or in contact with each other, thus causing a ground or short-circuit. Turn the lighting switch off and touch the positive battery cable terminal to the positive terminal of the battery. If there is a spark, it indicates a short-circuit or a ground. This trouble always should be corrected before making the final connection to the battery. Of

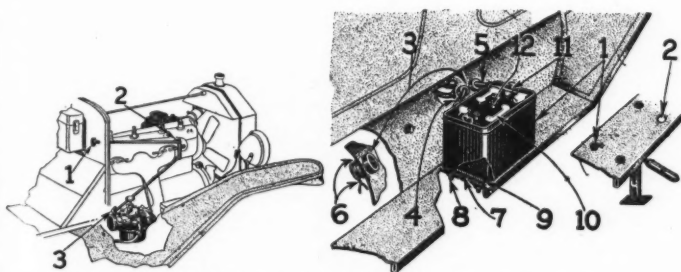
course, if there is no spark when the test is made, the connections to the battery may be made permanent. After connecting the battery terminals secure the cover 10 on the battery box, and place fuse 11 in fuse clips of lighting switch.

Operating Instructions

The two generator bearings and the two motor bearings should be oiled every 200 miles, and care should be taken to keep the oil-well covers closed.

The chain should not be allowed to run slack. When the system is first installed, or when a new chain has been put on, the chain should be adjusted occasionally during the first few hundred miles of travel until all stretch has been taken out of it. The chain stretch will be quite slight after being run perhaps 500 miles. After long service, when all chain adjustment has been taken up, the chain may be shortened by taking out a pair of links. The latest type of chain is supplied with a removable pair of links, retained in position by two removable pins, which are identified easily, as these pins are a trifle longer than the regular riveted pins.

(Continued next week)



Figs. 446 and 447, left to right—Fig. 446, Gray & Davis priming rod connections on Ford; Fig. 447, installing battery for Gray & Davis on Ford

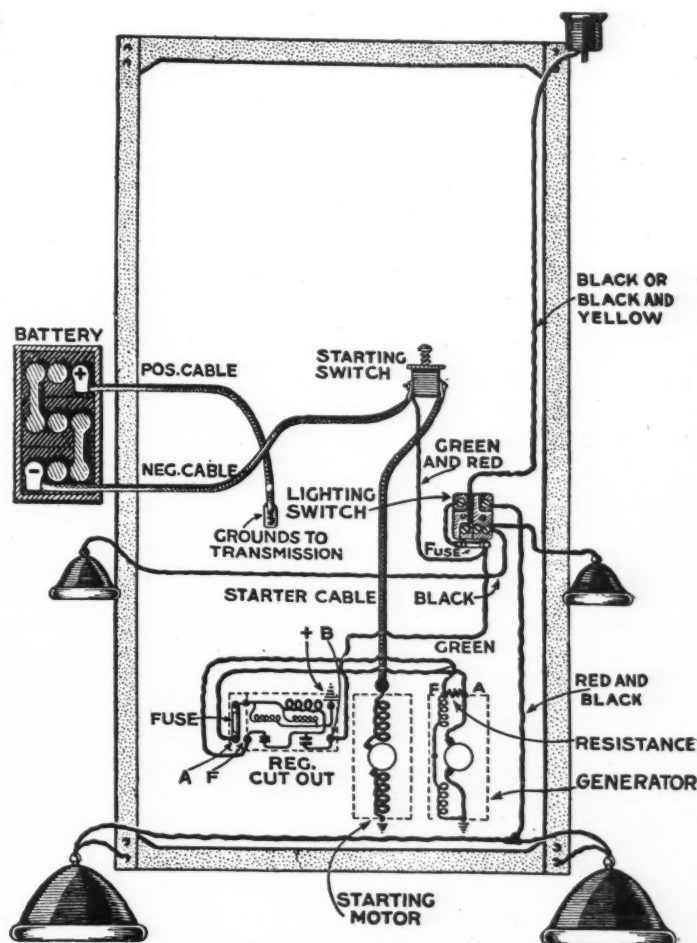
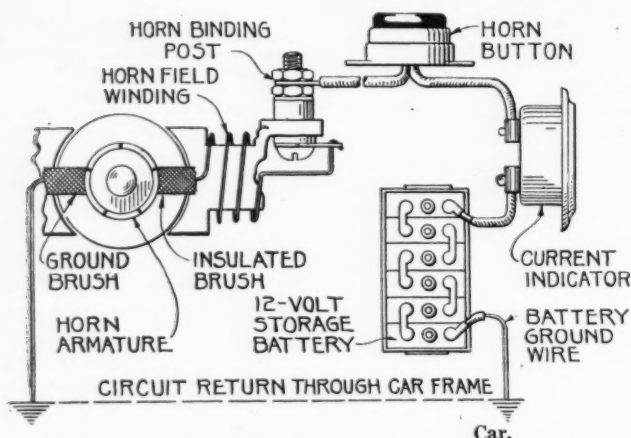


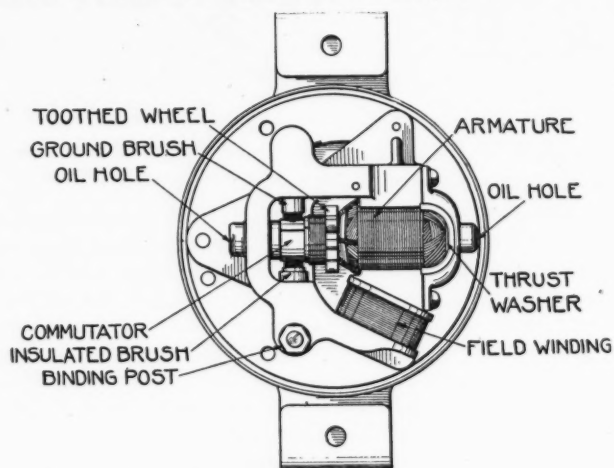
Fig. 450—Wiring diagram of Gray & Davis electric starting and lighting system on Ford, third-brush regulation

The Motor Car Repair Shop

Installation and Adjustment of Garford Horn



Wiring diagram of electric circuit of the Garford horn installed on a Dodge Brothers motor car



Garford horn with cover removed, exposing the entire mechanism with the various parts named for convenience

THE Garford motor horn employs an electric motor similar in design to that used in starting an engine and therefore must receive a certain amount of attention to keep it in operating condition.

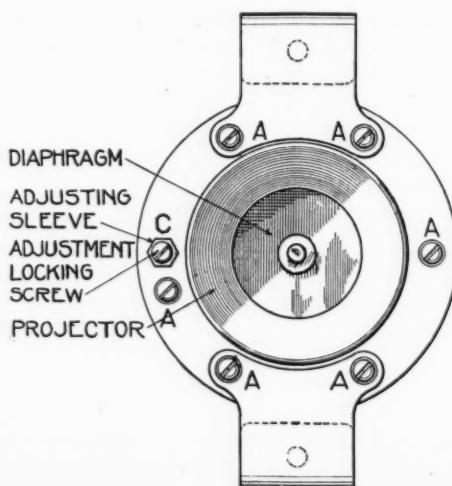
All of the wiring of the horn, including the binding post, is shown in the illustration. One binding post of the horn is located on the lug of the frame and permanently connected to one end of the field winding. The other end of the field is connected to the insulated brush holder, located directly under the binding post. The remaining brush holder is not insulated, so that the other terminal of the circuit is to the frame of the horn and to the grounded side of the battery through the metal work of the car. A specific instance of this installation is on the Dodge Brothers car.

When the horn is to be removed from the car for cleaning, take out the two bolts holding the horn bracket to the dash, rather than remove the screws that hold the bracket to the horn front. The latter screws also hold the motor in place and the removal of them would allow the interior to become deranged. The entire mechanism of the horn can be exposed to view by taking out one screw, located in the middle of the cover, so as to release the latter.

Oil Once a Month

The lubricating system of this horn is so designed that the horn will operate a whole season under favorable conditions without any attention. If it is given severe service it should be cleaned and oiled once a month. When used only two or three times a day—short blasts—clean and lubricate it once every four or six months.

The position of the commutator is shown in the illustration and it should be wiped clean with a dry cloth. Then apply a little vaseline to a clean rag and wipe on the commutator, rotating the armature with the finger so as to provide a thin film of lubricant over the entire commutator surface. Oil wicks are placed at the ends of



Tightening the six screws, A, usually stops a screech, while C adjusts the tone

the armature shaft. Apply a few drops of cylinder oil in the holes at these points and on the thrust washers. Use thin oil. Apply vaseline or non-fluid oil to the toothed wheel located between the commutator and armature laminations.

After the cover is fastened in place with the screw and lock washer, attach the horn to the car first by connecting the horn wire to the binding post, setting the nut tightly over this terminal. Be sure that the nut under the terminal of the binding post is set tight before putting the wire in place. Then attach the horn to the dash with the two bolts through the ends of the brackets, setting the nuts tight.

The adjustment for sound should be made only when necessary. If the signal note becomes weak or fails it may be due to lack of oil or to a commutator surface that has not been cleaned rather than to incorrect adjustment. If the signal starts with a correct note and suddenly becomes a screech, it indicates that the toothed wheel is not close enough to the diaphragm stud.

Tightening the six screws, A, which clamp the front of the horn against the diaphragm usually will make the signal operate correctly if it has a tendency to screech.

Before changing the adjustment of the horn at C be sure that:

1—The voltage of the battery on the car is up where it belongs. If the headlights show bright when switched on, the battery is all right.

2—See that the bearings, commutator and ratchet wheel are properly lubricated, as per previous instructions.

3—Have the bracket screws set tight.

4—See that the horn wire is connected securely to the binding post on the horn, to the horn push button, and the terminal of the current indicator.

5—Remove the horn and test direct on a 12-volt battery (on the Dodge Brothers car). Horns made for 6-volt systems should be tested on 6-volt systems.

The adjusting screw is located on the front of the horn at C as shown, so that the tone adjustment can be made without removing the horn from the car. To adjust, first loosen the locking screw at C about half a turn with a screwdriver.

Tone Should be Clear

Then turn the larger nut on the threaded adjusting sleeve, counter-clockwise, to bring the toothed wheel closer to the diaphragm or turn this sleeve clockwise to make less contact.

If the tooth wheel is set too close to the diaphragm it will not allow the horn to be run up to speed; therefore, it will give a slow ratchet noise to the horn.

When the correct adjustment is obtained the armature should be free enough to give a clear tone on a 12-volt battery and not screech when the battery is at its highest voltage. This condition can be obtained when the engine is running at about 25 m.p.h. and the battery fully charged.

Always set the adjustment locking screw tight after each adjustment and before testing the tone.



Making Perma- life Batteries

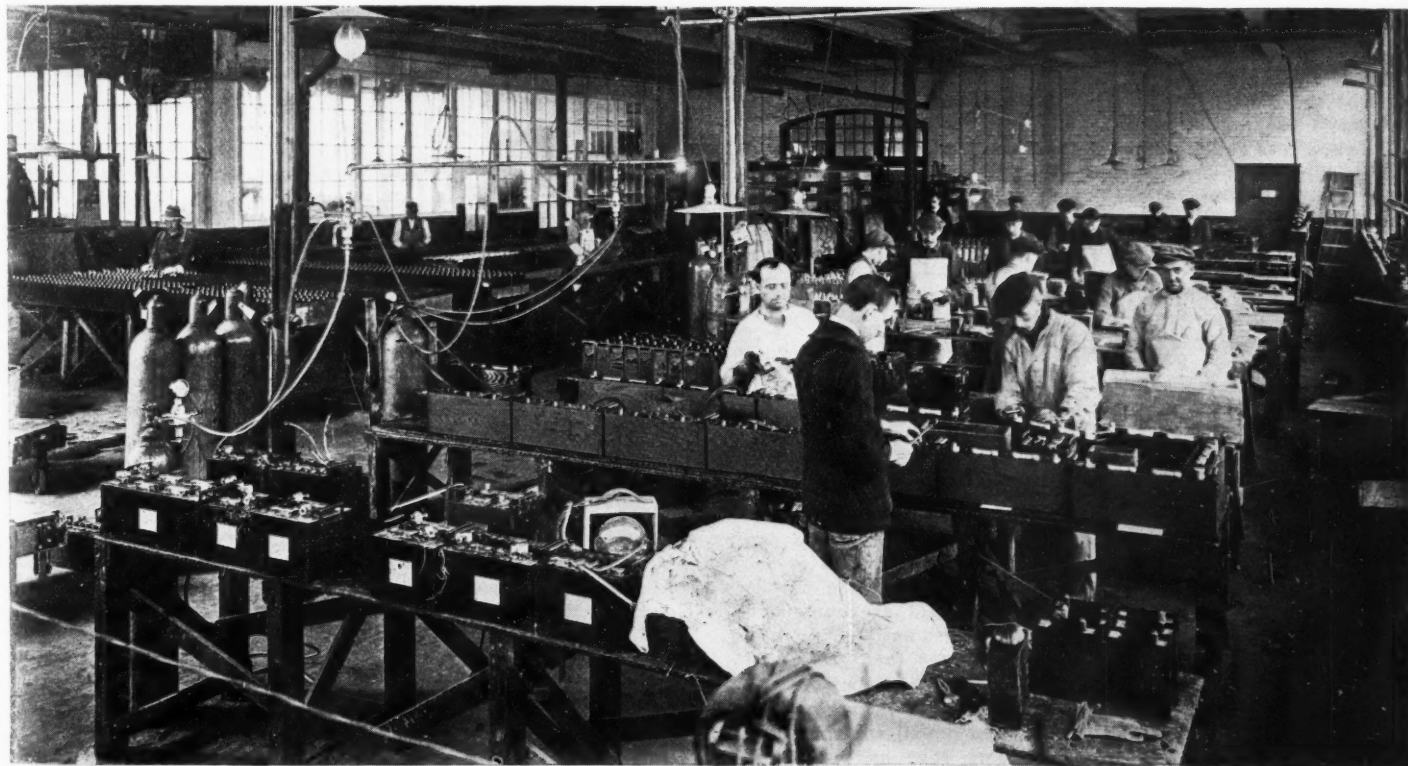


Workers in the lead room
wear protective masks

Top, in the laboratory and
forming room

Left, the wood-working shops
at Permalife

Below is a view of the room
for assembling



The Readers' Clearing House

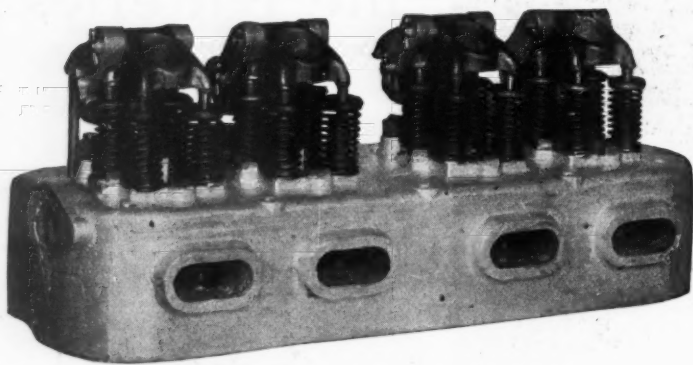


Fig. 1—Roof overhead-valve cylinder head for Ford cars

Engines

Size of Stutz Racing Engine

Q.—What is the size of the Stutz racing engine and is it a T-head or a valve-in-head?
—George Huycke, Topeka, Kan.

The Stutz racing engine is a four-cylinder sixteen-valve-in-head type with a bore of 3.816 and stroke of 6.5 in.

Size and Power of Overland Engine

Q.—What is the bore and stroke of the model 51 Overland engine?

2.—What is the factory rating and what horsepower will the engine develop?—Earl Boose, Decatur, Ill.

The bore is 4 in. and the stroke $4\frac{1}{2}$ in.

The N. A. C. C. rating is 25.6 at a piston speed of 1000 ft. per minute. We have no record of a block test of this model engine.

Overhead Valves on Ford

Q.—Explain and illustrate the Ford overhead valves.—H. E. S. Huth, London, England.

We presume that you refer to the overhead-valve cylinder head made for the Ford car by the Roof Auto Specialty Co., Anderson, Ind. This head replaces the regular Ford head and the valves are operated by pushrods which in turn are operated by the stock Ford camshaft. An illustration of the Roof head is shown in Fig. 1. This shows the location of the valves, four to a cylinder, and the method of operating them. The valves are $1\frac{1}{4}$ in. in diameter as compared with the $1\frac{1}{2}$ -in. valves of the Ford. Inasmuch as there are two inlet and two exhaust valves per cylinder, it is possible to take in and expel the gases much faster. Not only this but the

Experience Meeting



What Was Your Experience With Auxiliary Air Devices?

THERE are many devices on the market for attachment to the intake manifold and designed to furnish extra air to the engine when it is running.

Surely many of you have tried out these auxiliary air devices and have kept track of just what difference it made in the running of the engine, cooling and consumption of fuel. You who have this information can help others who may be thinking of installing such apparatus, by giving your experience with it. In writing, tell how you attached the device and on what make of car it was used. Tell also how many miles per gallon you obtained before installing the device and what the increase was after you made the change. Would you install another device like this if you had a car not so fitted? If not, what is the reason?

This will be used with your signature or not as you prefer, but in every case the letter must carry full name and address.

two inlet valves are capable of taking in a greater amount of gas than a single valve.

It is also pointed out that on account of the valves being smaller than the stock Ford valves, they will be less apt to warp and consequently require less grinding. Also the two exhaust valves will allow the burnt gases to leave the cylinder much more quickly and therefore prevent pitting and warping.

In the Roof head the combustion chamber is more spherical than in the regular Ford head and therefore not so much heat and power is lost to the cylinder head, which is the case when the latter is flattened out. Another feature is the machining of the interior of the combustion chambers. This not only prevents to a great extent the formation of carbon, but better engine performance is secured, owing to all cylinders having the same compression. Obviously this cannot be attained with a head that is left rough on the inside, as there is bound to be some variation in the thickness of the walls. An engine that has its combustion chambers machined in this way will run smoother and also show more power.

Engine Out of Time

Q.—I have a Hupmobile 20, 1910 model, with a new Breeze carburetor, new rings, new coil, switch and priming caps. I have just overhauled the engine and it runs good when idling, but has no power and cannot pull. One man can hold it when it has a standing start on low. Eight miles per hour is the best it will do on paved streets. Oil and smoke come from the breathers when the engine is running. I timed the valves as follows: I turned the engine over until the piston was at the highest point, just finishing the exhaust stroke, then when the inlet valve was just commencing to open I connected it up. I have a Bosch magneto with set spark and I set the spark ahead so it kicks some when cranked. It has good compression.

2.—Give timing of Hupmobile 20.—J. E. Andrews, Fremont, Nebr.

1.—It is obvious that the timing of the engine is wrong. This is explained in the answer to question No. 2.

2.—The flywheel of this model is located at the forward end of the engine. Now turn the flywheel until the marks CL-1&4-UP are in a line with the marks on the forward face of the cylinder block. Next shift the flywheel until this mark is $\frac{3}{8}$ in. to the right of the mark on the face of the cylinder block. The flywheel is to be maintained in this position while the camshaft

The Experience of Another

Likes Carbon Remover

Belmont, Wis., Editor MOTOR AGE—During the season of 1916 I drove a six-cylinder Oakland car. I had heard a great deal about the Johnson carbon remover, so I purchased a can and used it on my car. I believe it helped. I tried it out several times until I used up the can. I know it did not do any harm. It would shoot the carbon out of the exhaust and my car always had plenty of power. It proved satisfactory and in the beginning of the season of 1917 I put in a stock and sold several shipments.

During the 1917 season I used a six-cylinder Lexington and used the Johnson carbon remover off and on all summer. My car always pulled well also. Customers that had used the

carbon remover came back after more, so I believe it has helped and I cannot see that it has done any harm.

By placing some white paper just beyond the exhaust you can easily see the carbon accumulate on the paper. It looks like soot coming out of a chimney. What came out would certainly have remained in, if I had not used this carbon remover. I probably would have had considerable trouble, but as it is I have never had any trouble with either of my cars as far as carbon accumulation is concerned. I also use water injected into the hot-air intake of my carburetor, which I think helps, as it forms a steam which works into the cylinders.—Ira C. Peary.

is set in proper relation to the engine crankshaft.

The distributor board of the magneto should now be removed and the magneto removed by taking out the four bolts that hold it to its base and loosening the magneto gear cover which is bolted to the side plate. By referring to Fig. 2 the large timing gear can be seen at A and also note the marks on the face of the plate. If the side plate is free from the engine then turn the large timing gear with the plate until the marks across the face of one of the gear teeth are in a line with those on the face of the side plate. Now secure two $\frac{3}{8}$ by $2\frac{1}{2}$ in. standard cap screws and cut the heads from these and with a hack saw slot the studs so that they will receive the blade of a screw driver. Next screw these studs into the crankcase as shown at D and then slip the side plate onto these studs and with a plate raise the valve stems so that the side plate can be tapped into position. The large timing gear is to be kept in the position mentioned above during this operation. When replacing the side plate be sure to use the same number of gaskets that was originally on the side plate. The side plate can be bolted into position now provided the marks on the large gear coincide with the marks on the face of the side plate and the flywheel is in the same position mentioned above. The camshaft is now in proper relation to the crankshaft of the engine. Care should be taken when removing the plate holding up the valves in order not to bend the valve stems.

Before trying to attach the magneto first place the distributor brush in the position as shown by A in Fig. 2. Now refer to Fig. 3 and remove the conducting lead A and also the plate covering the armature. Now set the magneto so that it is $\frac{3}{8}$ in. from the side as shown in the illustration and mount the magneto so that it meshes correctly with the large timing gear without disturbing the magneto setting as performed above. Be careful when attaching the magneto that you have the proper play in the gear, as these should be so that no play can be felt when rocking the armature. It is imperative that you be careful and accurate when doing this work to have the engine function properly. The clearance between the valve stems and push-rods should not be greater than the thickness of a thin calling card.

Why Engine Gallops

Q.—What causes the engine of my Buick six to gallop, or surge? Have tried all possible adjustments of carburetor and inlet heating system to no effect. This engine has a cast-iron inlet manifold heated by a tube from the exhaust. Compression is good in all cylinders. The temperature of the engine seems to make little difference with the surging, as it will hit unevenly whether hot or cold. Would an aluminum inlet manifold be better than the cast iron?—D. C. Canfield, East Canaan, Conn.

This may be due to one of several causes; we would suggest that you first set the spark plug gaps to $\frac{3}{32}$ in. Next adjust the breaker points in the breaker box to conform with the thinnest of the gages on the ignition wrench supplied with the tool equipment. It is hardly probable that sticking valves could be the trouble as this would be affected by the changes in engine temperature. When you get the ignition system in accurate adjustment perhaps you can adjust the carburetor with

TO assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, such as ignition, carburetion, etc., MOTOR AGE has segregated inquiries into classes of allied nature. Questions pertaining to engines will be answered under that head and so on.

ENGINES

George Huycke.....Topeka, Kan.
Earl Boose.....Decatur, Ill.
H. E. S. Huth.....London, England
J. E. Andrews.....Fremont, Neb.
D. C. Canfield.....East Canaan, Conn.

THE ELECTRIC SYSTEM

C. E. Blasberry.....Adams, Ore.
R. W. Pennington.....Spokane, Wash.
Bethel P. Browne.....Henderson, Ky.
R. W. Reed.....Peoria, Ill.
Gerhard Goplerud.....Osage, Iowa
Anselm Warner.....Hepburn, Iowa
A. B. Stark.....Lamesa, Tex.
F. C. Ireland.....Baubstadt, Ind.

CARBURETION

Frank Thomas.....Augusta, Kan.
A. D. Benson.....Prairieburgh, Iowa

MISCELLANEOUS

E. V.....Columbus, Ohio
L. A. Stovall.....Seattle, Tex.
Harry C. Reed.....Dowa City, Iowa
C. M. Liggett.....Marion, Ohio
H. E. Huth.....London, England
George Huycke.....Topeka, Kan.
Reader.....Chicago
Herman Walters.....Beloit, Kan.
A. B. Stark.....Lamesa, Tex.
Anselm Warner.....Hepburn, Iowa
D. C. Canfield.....East Canaan, Conn.

No communication not accompanied by the name and address of the writer will be answered in these columns.

better success. Adjust the high-speed when the engine is warm so that it will just pop back through the carburetor when the throttle is thrown open. After having adjusted the high-speed, change the low-speed until the engine idles without surging. Surging at low engine speeds is usually due to too

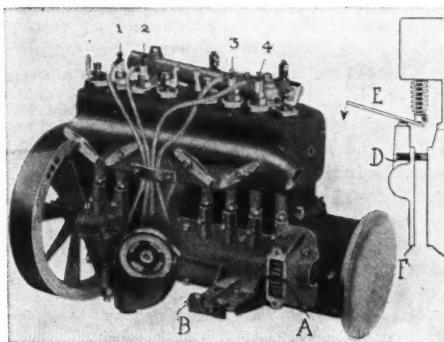


Fig. 2—Hupmobile engine with side plate in place

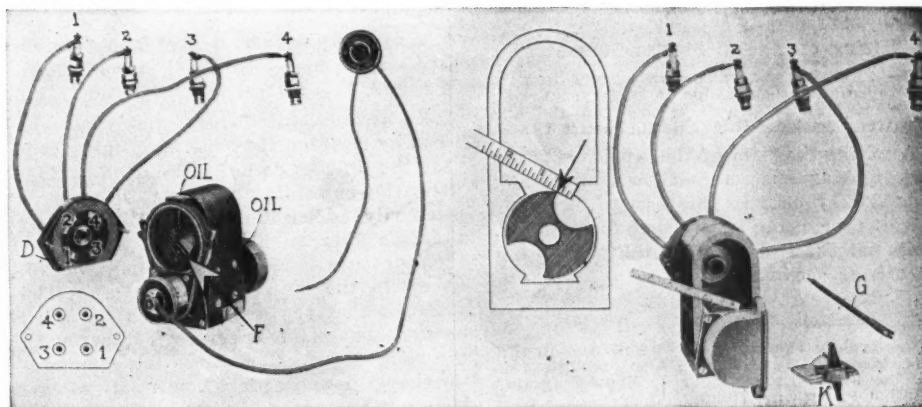


Fig. 3—Points to be observed in timing 1912 Hupmobile. A rule is used for setting the armature properly

rich a mixture. In winter running every effort should be made to maintain the same conditions for the engine as in summer. This can be accomplished by the use of radiator and louvre covers, as a warm engine will be more economical and a better performer than a cold one. It may be that some of your trouble is due to driving with too cold an engine.

We do not believe that changing the material used in the construction of the manifold would help matters any, as the trouble is due to lack of adjustments of some parts not functioning properly.

The Electric System

Intensifiers Not Injurious

Q.—Are any of the so-called intensifiers for Ford headlights injurious to the magneto, and to what extent?

2.—Do they in any way affect the vibrators?—C. N. Blasberry, Adams, Ore.

We see no reason why any of these devices should be injurious to either the magneto or vibrators on the coils. If they did any damage at all it probably would consist of burning out the bulbs in the lamps, on account of excessive voltage.

Running With Open Circuit

Q.—I am told that on model 75 and 83 Overlands if you use the car to any extent with the charging circuit open it will burn out the generator. What is the cause of this?

2.—What is the reason that on putting a 6-volt and 3-volt lamp in series across a 6-volt circuit that the 6-volt lamp burns up to candle-power and the 3-volt burns dimly?

3.—Explain a Cadmium test for storage batteries.—R. W. Pennington, Spokane, Wash.

1.—If you remove the storage battery on either the model 75 or 83 Overland you must do something to take care of the current coming from the generator, provided the engine is running and the generator being driven. The storage battery acts as a reservoir for the accumulating current and if you remove it, naturally the output must be taken care of in some way or serious damage will be done to the lights or generator. The increased voltage from the generator due to no resistance from the storage battery will be so heavy that the generator windings will be burned out.

If you take out the battery or disconnect the generator wires, do not operate the engine until they have again been connected. Or, in case such operation is found necessary, be sure to connect a short piece of bare copper wire from the terminal post of the generator to one of the brass screws in the name plate. This grounds the gen-

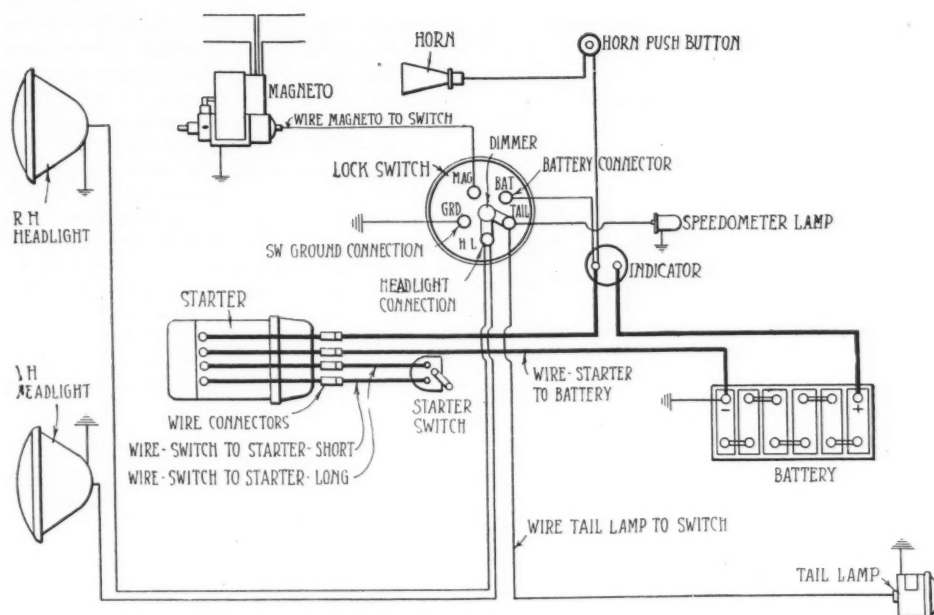


Fig. 7—Wiring diagram of 1917 Dodge Brothers car

motor-generator.—R. W. Pennington, Spokane, Wash.

The circuits you ask for showing the internal connections of the various units in the U. S. L. starting and lighting systems as used on the Overland 69 and 71 models are shown in Fig. 6. Both of these models used the same systems.

Wiring of 1917 Dodge Brothers Car

Q.—Please publish the wiring diagram of the 1917 Dodge Brothers car.—Anselm Warner, Hepburn, Iowa.

A wiring diagram of this car is shown in Fig. 7.

Wiring of 1915 Maxwell

Q.—Furnish wiring diagram for the Simms-Huff starting and lighting for model 25, 1915 Maxwell car.—F. C. Ireland, Baubstadt, Ind.

A wiring diagram of the Simms-Huff system as used on this car is shown in Fig. 10.

Carburetion

No Power on High Gear

Q.—I have a 1911 Model A Stoddard-Dayton car, four-cylinder, 4½ by 5. I bought the car May 10, 1916, and used it all year until November, when I overhauled it, ground the valves and tested them for proper starting, adjusted the overhead rocker arm and push rods to ⅜ in. clearance. The magneto is in first-class condition. It is a Bosch. I put new slings in the carbureter, a Stoddard-Dayton Stromberg, and since then the car will not pull good on high or second speed, but has lots of power on low, sometimes I can get from 45 to 48 m.p.h. and again only about 35. Would air pressure on the gas tank, which is hung on the rear and fed to the carburetor by pressure, have any effect on this, or is it in the adjustment of the carburetor? The compression is very good and intake connections tight. What would be the probable cause of the uncertainty of speed and power?—A. D. Benson, Prairieburgh, Iowa.

If you are sure that ignition, valves, compression, etc., are in good shape, we would suggest that you hunt for the trouble in the carburetion system. In the first place it appears to us that you are using a carburetor that is too old to cope properly with the present-day fuel. We do not believe that the new springs you put in the instrument helped matters any as they are too stiff at higher speeds. The chances are you would be far better off with a more up-to-date carburetor and perhaps you could trade in your old one for a new

type. The carburetor you have was very well suited for the gasoline obtainable in 1911 and 1912, but naturally it cannot be expected to perform well with the present heavy fuel.

A partially-clogged gasoline line or spray nozzle on the carbureter, sticking float valve and gasoline-logged float may cause trouble of this kind. There may also be air leaks in the joints of the intake manifold and cylinders which often are very mysterious to find. These might appear especially after the engine has been down for overhauling.

Irregular on Open Throttle

Q.—I have a Model 37 Hudson that idles well on slow speed, but when I open the throttle, it commences to pop in the carburetor or exhaust. It seems as though it does not get a rich enough mixture and has little power. The engine is equipped with a Zenith carburetor. The engine has good compression and is timed right. Ignition seems to be good. Do you think the trouble lies with the carburetor?—Frank Thomas, Augusta, Kan.

The trouble apparently lies in the carbureter and it would be well to remove the

instrument from the engine and clean it thoroughly, particularly the compensating jet and the gasoline strainers. It would seem from the description that the fuel is not being supplied to the engine fast enough. However, if this does not prove to be the trouble then it would probably be due to sticking valves. Before removing any of these pass about a half gallon of half kerosene and water through the carburetor into the engine when it is running. Run the engine at a high crankshaft speed and supply the liquid faster than the engine can handle it. This will flood the valve stems and tend to free them up if they are sticking. If the valve stems are badly carbonized it will be necessary to remove the valves and clean the stems, as the liquid will not be effective in bad cases of this nature. Sticking valves can be located sometimes by observing the valve action when the engine is throttled.

Miscellaneous

Gear Probably Out of Mesh

Q.—We have a 1917 Paige which has developed a peculiar grind, noticeable only when coasting. It is felt whenever the engine is not pulling, either in gear or neutral and with clutch in or out. The grind is one which is felt rather than heard and seems to be in the gears or universal, probably the latter. This developed after the car was stopped very suddenly to avoid an accident. We jacked up one rear wheel and threw it in gear and the wheel has about a quarter-turn play. Can you suggest a remedy for this grind?—E. L. V., Columbus, Ohio.

It is hard to suggest a remedy when we do not know the exact nature of the derangement. Sudden application of the brakes, especially if the car is traveling at a fair rate of speed, is liable to cause serious damage in the rear axle or propeller shaft. For one thing, the drive pinion and ring gear may be thrown out of alignment, or, as you assume, the universal joints may have been damaged. Excessive play in the universal, or stripping of several teeth from the ring gear would be manifested by considerable movement of the rear wheels when the car is jacked up. A quarter turn is far too much backlash, and we suggest

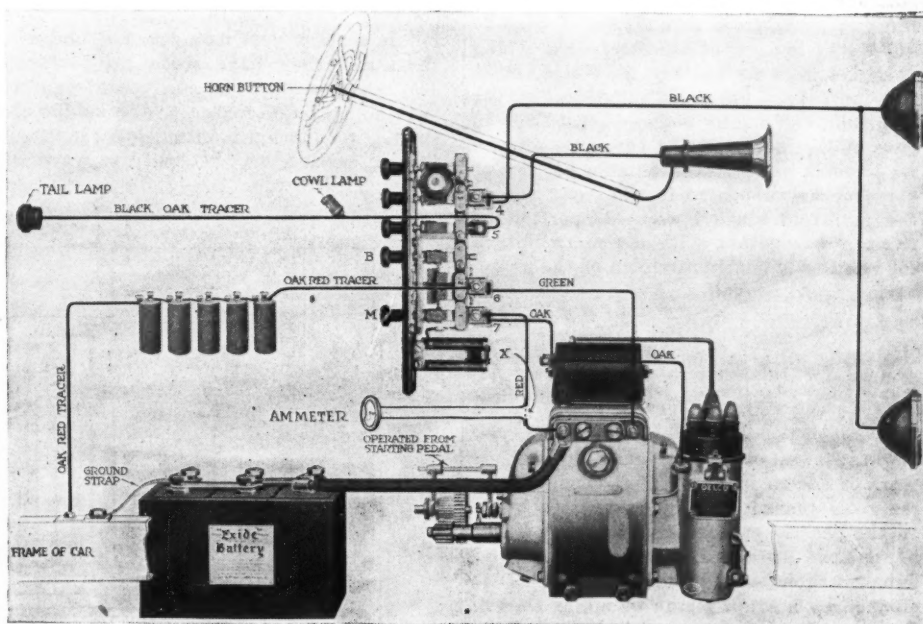


Fig. 8—Wiring connections of model 25 Buick 15 car

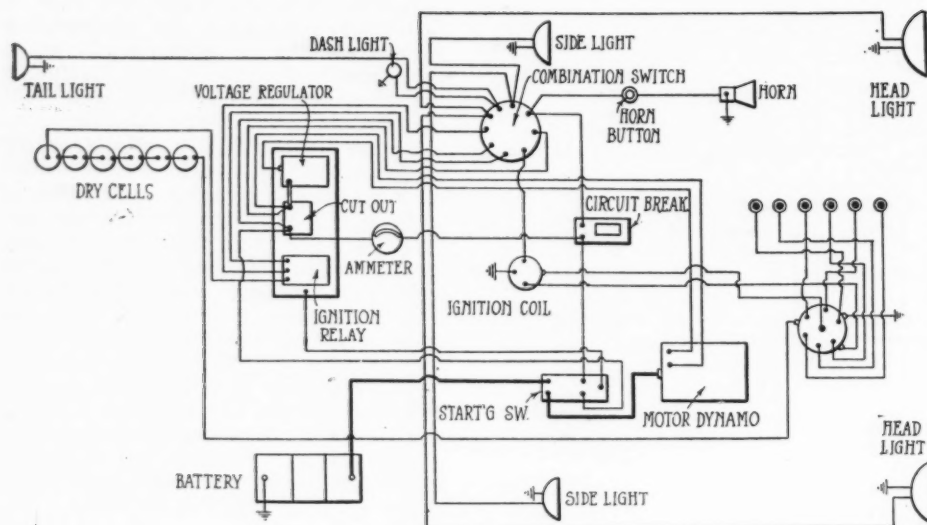


Fig. 9—Wiring diagram of Delco system on 1914 Buick car

that you remove the cover of the differential housing and look at the gears to see if there are any broken teeth. If this proves to be the case, it will be necessary, of course, to substitute new gears. It may be also that the sudden stopping allowed one of the bearing caps to spring out of place so that one of the axle shafts is not running true. This would cause improper meshing of the gears and consequently set up a distinct growl. Really the best way to locate and remedy trouble of this kind is to take the car to a service station and have a competent mechanic look it over, because even if you should locate the trouble the remedy probably would be beyond your ability or equipment.

Fouling of Ford Plugs

Seattle, Tex.—Editor MOTOR AGE—I have read with interest the discussion by subscribers to MOTOR AGE of No. 1 Ford plug fouling. In Jan. 10 issue I note a splendid article in explanation of this trouble by Mr. Clayton Smith, Iowa City, Iowa, in which he says trouble is due to action of centrifugal force, etc., throwing heavy portions of fuel against side of manifold farthest away from carbureter. I wish to know why in view of his theory No. 2 plug does not foul as quickly as No. 1, since they both take gas from same arm of the manifold, especially when according to laws of liquids in motion the same process we have in gas striking outside portion of goose neck is repeated in the front arm of the manifold since horizontal portion of front arm together with its sharp upturn for ventura is nearly a replica of the goose-neck.—L. A. Stovall.

Auxiliary Oiling System

Q.—Give diagram for an auxiliary oiling system for the Empire four-cylinder car, which might be needed for high-speed driving.—George Huycke, Topeka, Kan.

A suggested oiling system which you might use in connection with high-speed work is shown in Fig. 13. It consists of a reservoir placed at any convenient place on the chassis and from which the oil can be pumped to the crankcase by a hand pump. From the crankcase the oil is pumped by a small piston pump, as shown. To place the pump on the engine a hole is drilled in the crankcase directly opposite one of the cams on the camshaft. This

hole should be large enough to allow the head A of the pump piston to pass through it. The pump parts are made of brass and consist of the tube B screwed to the flange C, the latter being provided with four holes for caps screws which hold the pump in place. The pump piston can be made of steel and is actuated at one end by a coil spring and the cam on the other. A bushing, D, is fitted to B, to which the remaining part of the pump is fitted. This part carries the check valves, and the manner in which they should be placed is shown.

Refinishing Celluloid Lights

Q.—Is there any preparation on the market for coating or varnishing the lights of celluloid in side and rear curtains, so they will not dry out and crack, as most of them do in about a year's time?—D. C. Canfield, East Canaan, Conn.

Acetone varnish can be used for this purpose, it is said. It can be secured from the Arlington Co., New York.

Ball-Bearing Steering Heads

Marion, Ohio, Editor MOTOR AGE—Some time ago I saw where someone inquired about installing ball bearings on the steering heads of a Dodge Brothers car. I put in a set a year ago, ran 5000 miles on them and they have stood up perfectly. The machine steers so easily that you can take hold of the center of the spider and steer with one hand on smooth roads. In fact, it turns nearly as easily as when the

machine has the front wheels jacked up and it runs more steadily and is not nearly as tiresome. I installed thrust bearings with a pressed-steel jacket. No dirt can get into the balls, and it looks well. I had to cut off $\frac{1}{4}$ in. of the lower end of the steering knuckle to make room for the set, and as the center hole in set was larger than the spindle bolt I put in a brass bushing which keeps the bearing centered. The cost of this installation was about 2 hr. time sawing off the lower end of knuckle, fitting same and 80 cents for the bearing sets. I would not think of having them taken out and the original arrangement resorted to. The accompanying drawing will make the idea clearer.—C. M. Liggett.

Fatigue of Car Frame

Q.—Which is harder on the frame, to block up a car and run it 40,000 miles in gear or to run the car 40,000 miles on the road?—Harry C. Reed, Dow City, Iowa.

This is a peculiar question and one on which there is no definite information, especially with reference to the stationary test. Frames in actual service seldom fail or become out of alignment unless it is due to some cause other than pure service. The frame is subject to considerable loads, but the most of the road shocks are absorbed by the springs. The flexible mountings for the various car units which are in use make it almost impossible to permanently distort a frame.

If the car were blocked up and the engine run the equivalent of a certain mileage, we do not believe this would have any serious effect upon the frame. However, if the engine were run throughout the test at its critical speed, the vibration would probably result in the failure of some parts, although the frame would not suffer as much as other parts.

Underslinging Ford Springs

Q.—Give method of underslinging Ford springs.—H. E. Huth, London, England.

There is no way in which to undersling the Ford springs, but it is possible to lower the frame by brackets. The frame is supported usually at the front by a bracket shaped like a gooseneck, the top resting on the front spring while the lower portion carries the frame. This means that the front radius rods must be lengthened somewhat on account of the axle and spring being placed ahead of the front frame cross member. At the rear sometimes the frame is shortened and instead of using

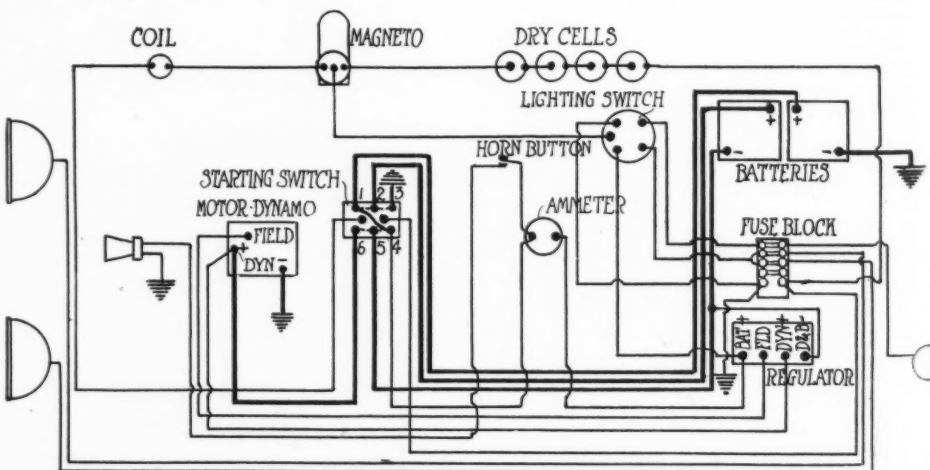


Fig. 10—Wiring diagram of Simms-Huff system on Maxwell

the saddle over the spring as in the conventional Ford construction, a straight cross member is riveted to the frame side members and then the frame supported by gooseneck hooks or braces from the springs in the same manner as the front.

Another way of lowering the rear part is to cut the frame in to about 1 ft. from the end, using a 45-deg. angle cut. This leaves the saddle intact over the rear spring, with a short length of the frame fastened to it on each side. Brackets are now made to fit into the channels of the frame as shown in Fig. 12. When in place they are riveted. This makes a satisfactory job and can be done by anyone handy with tools.

Bearings for Cyclecar

Q.—I am building a cyclecar to be driven by a Henderson motorcycle engine of about 12 hp., complete machine to weigh about 350 lbs. Drive will be from engine, which will be placed under the hood, to a jackshaft by chain and from jackshaft by a chain to each rear wheel. The jackshaft is to be mounted in ball bearings in blocks bolted to either frame member, about 24 in. apart. What type and what size inside and outside diameter would you advise for these bearings?—Reader, Chicago.

For a job like this the jackshaft would be about 1 in. in diameter and this could be mounted satisfactorily on No. 305 radial ball-bearings. The inside diameter of the inner race of this bearing, that is, the diameter of the hole through it is a little less than 1 in. To be exact it is 0.984 in. The overall diameter of the bearing, that is the outside diameter of the outer race is 2.441 in. These bearings are in the medium series and the single row type will be sufficient for all needs. The size bearing given herewith is figured with a large margin of safety and if you like, you can safely fit a bearing somewhat smaller, say a No. 304, which has an internal diameter of 0.787, while the overall diameter is 2.047 in.

His Hudson Hard to Start

Q.—I have a Hudson Super Six a year old which is very hard to start. I had a primer installed on car and it is still hard to start. What do you think is the trouble?—Herman Walters, Beloit, Kan.

You do not state whether the car is kept in a heated or cold building. This fact has much to do with the way in which the average engine starts in winter. If you keep it in a cold place the gasoline will be hard to vaporize and even with a charge introduced into the cylinders by the priming device, it is very hard to get a mixture that will fire readily. Also you should use a good grade of gasoline in starting or priming, 70 specific gravity, if you can get it.

Also get the habit of accelerating the engine and closing the choke when you turn off the switch, so that the engine will draw in a full charge of gas. It is surprising how long this charge will remain in the cylinders after the engine has stopped, and how it will help in starting the engine the next time.

Do not have the throttle open too wide when you turn over the engine. By keeping the throttle only partially open, about a fourth on the quadrant, the suction is greater at the jet and the throttle valve constitutes an obstruction which assists in breaking up the gasoline or vaporizes it to a much finer degree.

There is also a knack in operating the

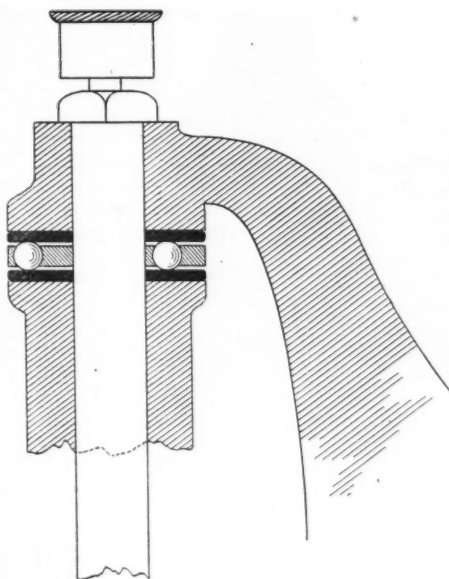


Fig. 11—Reader's installation of ball bearings on steering heads of Dodge Brothers car

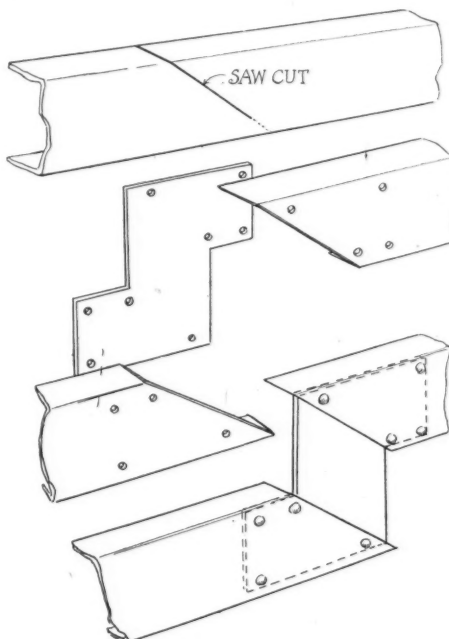


Fig. 12—Suggested method for lowering rear part of Ford frame

cash control, inasmuch as the shutting off of all air may be overdone and the engine flooded with raw gasoline to a degree where the mixture has become so heavy that it will not ignite.

Be sure also that the points of the distributor are in good order, as priming will do no good if there is not a good spark. Naturally, valves, plugs, etc., must be in good order if easy starting is wanted. Other causes for failure to start are weak ignition due to a depleted storage battery, ignition unit shorted, water on coil or terminals or improper carburetor adjustment.

Speedometer on Dodge Brothers

Q.—Can the speedometer of a 1917 model Dodge Brothers car be relied upon to tell the speed of the car? State how to find out if it is correct.

2—What parts would be necessary to raise gear of a car?—A. B. Stark, Lamesa, Tex.

1—Yes. There is no reason why the speedometer of this car cannot be relied upon to tell the miles per hour accurately. In rare cases an instrument might be inaccurate. One way to test a speedometer and secure fairly accurate results is to drive the car at a certain speed, say 20 m.p.h., over a measured 4 miles and noting the time it takes to cover the distance. If it takes in this case just 12 min. it shows that the speedometer is accurate, provided it indicates a speed of 20 m.p.h. for the entire distance.

2—To raise or lower the gear ratio of any car it is necessary to install a new drive pinion and ring gear. One cannot be changed without the other, as the gears would not be of the same pitch and consequently not mesh properly.

Gear ratio can also be changed slightly by increasing or decreasing the size of the tires, but strictly speaking this cannot be called a change in gear ratio inasmuch as the gears are not disturbed.

Kerosene in Radiator

Q.—Is it dangerous to use kerosene in the radiators of any cars instead of water?—Anslem Warner, Hepburn, Iowa.

There is no danger when using kerosene, but its use as an anti-freeze solution is not particularly recommended on account of the extremely unpleasant odor when the engine gets warmed up. Kerosene is also harmful to the hose connections.

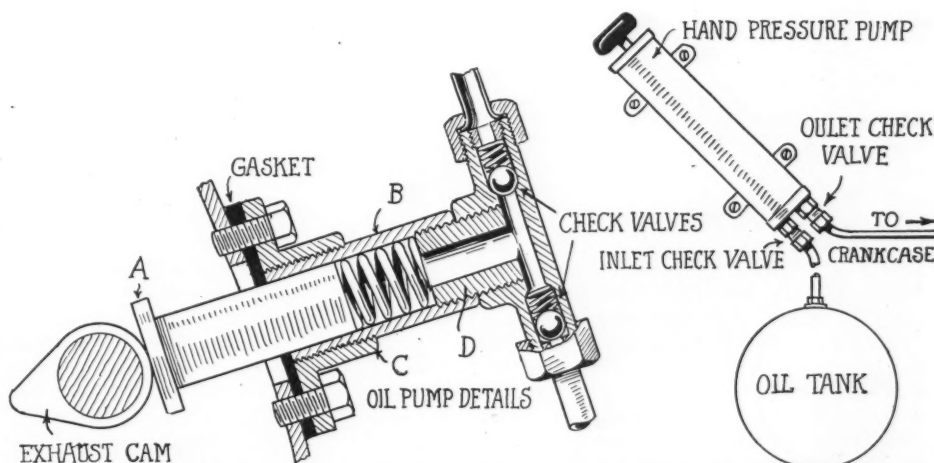
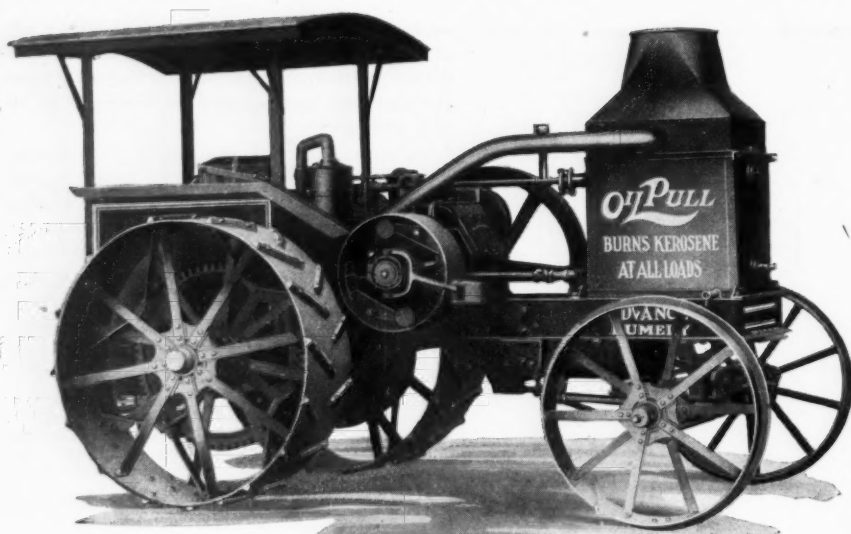


Fig. 13—Suggested auxiliary oiling system for high-speed work with Empire four-cylinder car



Rumely Adds Small Tractor

Burns Low-Grade Fuel,
Has Rating of 14-28 Hp.

THE small Rumely tractor, a product of the Advance-Rumely Thresher Co., LaPort, Ind., burns low-grade fuel and has a rating of 14-28 hp. It is fitted with an engine of the low-speed, two-cylinder, horizontal type and with all supplies on board, ready for work, weighs 8700 lb. It is guaranteed to pull up to five 14-in. moldboard plows, to turn over 14 acres of ground in a 10-hr. day and to handle on the belt a 24-in. separator fully equipped.

The two cylinders are cast in a single piece with separate heads with bore and stroke 7 by 8½ in. The engine delivers its rated power at 530 r.p.m. Each piston is fitted with four diagonally-split rings above the piston pins and with an oil scraping ring at the lower end. Ignition is by low-tension or make-and-break sparks. A Bosch magneto is used. The spark plugs are Rumely made. Cooling is by oil, and lubrication is partly by a mechanical oiler and partly by splash. As mineral oil has a much higher boiling point than water it is possible to operate the engine cylinder at a much higher temperature with oil than with water cooling. The capacity of the cooling system is 18 gal. No fan is required.

Starts on Gasoline

Starting is on gasoline, and the fuel tank has a capacity of 31 gal. of kerosene and 3½ gal. of gasoline. A Secor-Higgins carbureter is used. This has two horizontal nozzles with several outlets each. One nozzle is for kerosene and one for gasoline. With the Secor system water is injected into the cylinders to prevent pre-ignition.

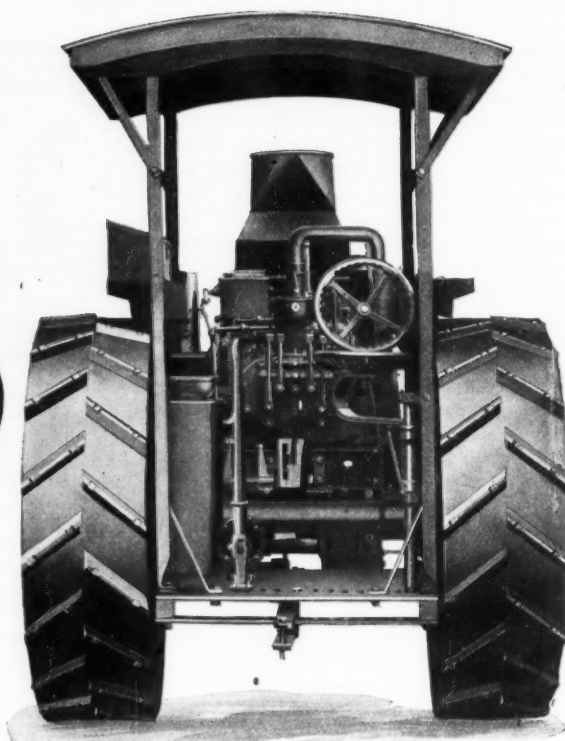
An extension of the crankshaft carries the belt pulley which is 23 in. in diameter and has a face width of 8½ in. At 530 r.p.m. this gives a belt speed of about 3200 ft. a minute. This pulley is ordinarily loose upon the shaft but can be secured by the friction clutch. The clutch

is of the expanded sector, or shoe, type, comprising two shoes operated by a shipper lever. The expanding members are counterbalanced so that centrifugal force has no effect on them. As the clutch is located inside the belt pulley and near the outer edge of same it is easy to adjust it. Only one adjusting device is provided, the adjustment being equalized between the two sectors. The belt pulley being located on the engine crankshaft, its speed is the same as that of the engine, namely, 530 r.p.m.

Three Speeds

The transmission is of the sliding-pinion type and affords two forward speeds and one reverse. It is inclosed in a semi-steel casing made in two parts. The lower half of the transmission case is removable for inspection and adjustment. All gears are of steel, have machine-cut teeth and run in an oil bath. A brake drum is located on an extension of the intermediate shaft outside the gear housing. This brake is lined with friction fabric and is operated by a pedal located convenient to the driver. It is said to be capable of holding the tractor securely on either an up or a down grade of any ordinary steepness and to stop it within its own length. All bearings on the transmission shaft are of the Hyatt flexible roller type. The two speeds are 2-1 and 3 m.p.h., and the reverse speed is 2½ m.p.h.

The frame is of 8-in. section channel steel, the side members and cross members being hot-riveted together with angle plates. Each frame member is a straight piece, insuring the maximum strength. The rear axle, which is of high carbon steel 3¼ in. in diameter, is mounted in Hyatt high-duty roller bearings at both ends of a tubular supporting casting of the cannon type. By the use of this type of rear axle housing a generous lubricant capacity is provided. The driving wheels are 56 in.



Side view of Rumely 14-28 Hp. OilPull tractor and rear view, showing controls

in diameter and have a width of 18 in. They are of the built-up type with T-head steel spokes. Detachable grouters are used, which permits of the tractor being used for hauling and road work without damage to paved streets.

The front wheels are 40 in. in diameter and have a width of 7 in. A built-up front axle is used, thoroughly braced. The steering gear is of the motor car type, the tractor being steered by a hand wheel, the shaft of which extends forward and carries a worm at its end. To permit the front wheels to accommodate themselves to sloping ground the front axle is pivoted at the center. To provide plenty of belt clearance, an arrangement is provided whereby the front axle frame can be moved laterally with respect to the frame whenever it is desired to use the tractor for belt work.

Control Is Convenient

The operator's platform is placed only a step from the ground. A canopy over the driver's seat is regular equipment and is so constructed that the operator has a clear view in every direction. All of the control devices are within easy reach, including the gear shifting lever, the clutch lever, the steering wheel, the brake pedal and the carbureter and ignition hand levers. The gearshift lever works on a slotted quarter, the control being of the selective type. The fuel tanks, which are calculated for a day's supply, are so located as to be easily accessible for filling.

The drawbar construction is referred to as of the swinging spring cushion type. It is located directly below the platform and so designed that the hitch can be made at from 14 in. to 19 in. above the ground, with a wide range of lateral adjustment. At the front end of the drawbar is a spring for cushioning heavy shock.

At a small extra charge a light but posi-

tive steering device can be furnished, which makes the tractor self-steering for plowing. This steering device easily can be lifted and dropped by the operator without getting off his seat, and holds the tractor and plows exactly in line with the furrow.

Detroit Body Makes Detachable Tops

THE Detroit Weatherproof Body Co., Detroit, is manufacturing a detachable top for the more popular-priced cars, including the Ford, Overland, Buick, Chevrolet, Maxwell, Hudson, Chandler and Chalmers. These tops feature light weight, simplicity of attachment, absence of overhang and the comfort attendant with a closed car.

They are of the sedan type, the deck and rear being covered with a good grade of top material. With the exception of the Chalmers and Hudson models, the regular windshield is used, and a visor with side strips incorporates it with the top. On the touring models, a narrow vertical support is placed between the compartments, forming the door sides and leaving an exceptionally large opening for entrance and exit.

Light weight is obtained by the special door construction. These doors are of flexible celluloid, raising and lowering in the manner of the common roll window curtain, the operation of the usual door remaining unchanged. This construction permits ready installation and easy operation, besides being practically free from rattles. A large oblong plate glass window in the rear, and plate glass windows in the two rear quarters are the only glass used in the construction. The rear quarters may be removed readily, if desired,

providing an open car with permanent top for warm weather.

Usually, about 3 hr. are required for complete installation. It is first necessary to remove the old top, after which the new top is bolted in place, using the old top iron as supports. The sides fit flush with the body sides, without overhang, and are designed to conform with the lines of the car.

The interior is lined with a good grade of limousine cloth, and there is a 3-in. dome light, wired for connection with the lighting circuit. The weight varies but in general is about 50 lb. heavier than the standard top. The prices on several of the models are as follows: Ford, touring, \$87.50; Overland, Model 83-5, \$115; Buick, D-45, \$140; Chalmers, 6-30, \$97.50; Chandler, 1917-18, with three-piece built-in windshield, \$185; Hudson, with three-piece built-in windshield, \$190; Chevrolet, 490, \$110; Maxwell, roadster, \$130, touring, \$145.

Collier $\frac{3}{4}$ -Ton Truck With Three Bodies

THE Collier Motor Truck Co., Bellevue, Ohio, is manufacturing a $\frac{3}{4}$ -ton truck fitted with any one of three bodies and selling for \$885. Features of this truck are lightweight and flexibility. It is assembled from standard units and is designed throughout for heavy duty. A four-cylinder Lyeomg engine with a bore of $3\frac{1}{4}$ in. and a stroke of 5 in. is used. Conforming to modern practice, the valve mechanism is entirely inclosed and automatically lubricated. The oil is circulated by a plunger pump and is of the positive feed type. Cooling is by a thermosyphon, a zig zag tube radiator being used.

Among the engine accessories are a

Zenith carbureter and a Connecticut ignition system. The electrical system is particularly complete for truck practice, comprising an Auto-Lite starting and lighting system with a Willard storage battery.

The gearbox and truck are a unit with the engine, a dry-plate Raybestos on steel clutch being used with a three-speed sliding gearset. The drive is taken through a propeller shaft fitted with two universals to the three-quarter floating Salisbury rear axle. This axle carries both the service and the emergency brakes and has a final ratio of 6 to 1.

Both front and rear springs are semi-elliptic, the former being 37 in. long and the latter 50 in. long. The wheelbase of the truck is 118 in., and it is mounted all around on 32 by 4 in. pneumatic tires. The weight complete is 2600 lb.

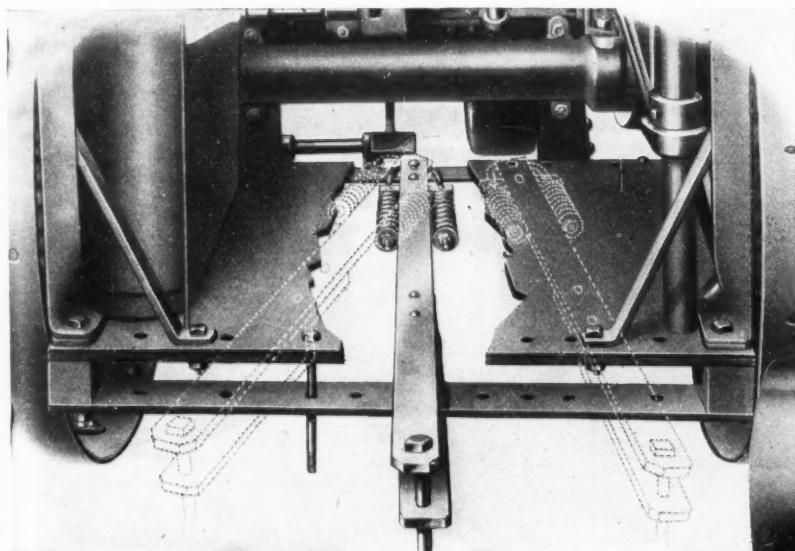
Each type of bodies has loading space of 7 ft. The first is the completely inclosed body, the second the open express body with a driver's cab, and the third is the completely roofed express body.

SAMSON TRACTOR COSTS \$1,750

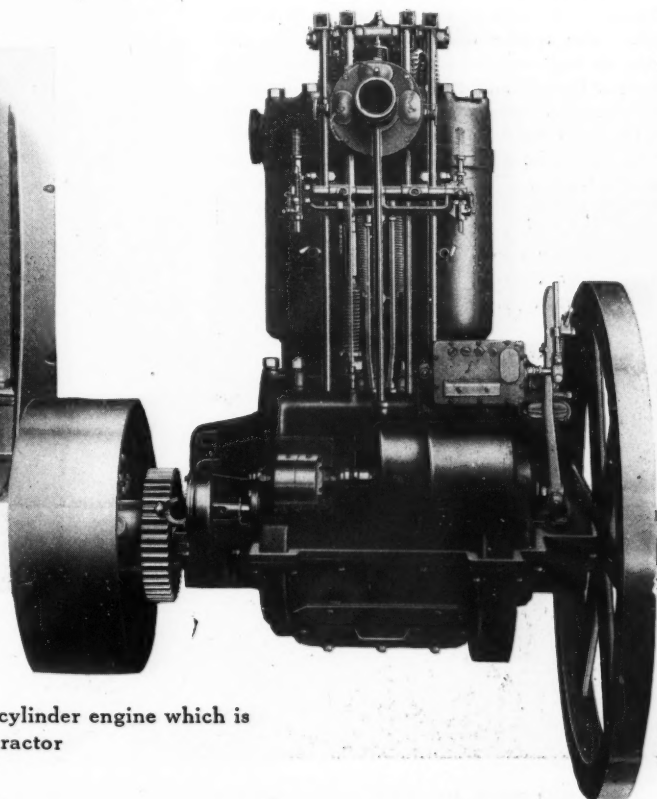
Changes, together with the increased cost of manufacturing, made it necessary for the General Motor Truck Co. to increase the price of the GMC Samson tractor this spring, so it sells at \$1,750 instead of at \$1,500 as stated in MOTOR AGE recently.

MINERVA TO MAKE ENGINES

Cleveland, Ohio, Feb. 1—The Minerva Engine Co. has been organized to make a heavy-duty tractor and truck engine which has been designed by C. S. Goby and R. K. Johnson. Only one model will be produced at present, a 4 by $5\frac{1}{2}$ four-cylinder vertical type with L-head cylinders.



Drawbar construction on Rumely small tractor, which is of the swinging spring-cushion type



Top view of the low-speed, horizontal, two-cylinder engine which is on the Rumely Oil Pull tractor

The Accessory Corner

Hercules Bumper

THE Hercules bumper is made of spring steel which is tested thoroughly and is warranted of great strength and durability. Adjustment is simple and can be made in 10 min., it is claimed. The construction is such as to eliminate rattle, the springs giving the strength necessary to withstand severe bumps. Finish is black enamel as standard and nickel at \$1 extra. Prices vary from \$11 for the Ford size to \$14 for that for larger cars. Hercules Spring Bumper Co., 212 West Fiftieth street, New York.

National Spark Plug

The main feature of the National spark plug which differentiates it from other spark plugs is the construction of the firing surface, which has no points but presents a plane firing surface which gives any number of firing places. The wrench site is an inch long, allowing plenty of room for manipulation even in a countersunk plate. Price, \$1.50.—National Motor Car Supply Co., Newark, N. J.

Winch for Trucks

The Otis power winch for use on motor trucks consists of a winding drum which rotates freely on a drum shaft, a worm and gear reduction inclosed in a cast iron gear-case, a clutch-operating device and a brake, all substantially mounted and of sturdy construction. The drum is capable of carrying about 650 ft. of ½-in. steel rope. It is provided with brass bushings and rotates freely on the drum shaft in either direction. Lubrication is by an occasional filling of the oil chamber in the drum with regular heavy-grade machine oil. The brake wheel and flange is carried on the outer end of the drum to which it is attached substantially. The brake is of the double-acting, external-contracting type lined with multibestos and is of sufficient power to hold the entire capacity load of the winch. The winch is driven by power from the truck engine by a sprocket and chain or a universal joint connection between the worm shaft of the winch and the power take-off shaft of the transmission or main driveshaft. It is designed to

be mounted on the chassis directly behind the driver's seat and is so arranged that connection can be made readily from the clutch-operating device and brake lever to the hand levers.—Otis Elevator Co., New York.

Mayhew Radiator Curtain

The Mayhew radiator curtain is an adjustable radiator shield attachable to near-

ly every car except the Ford. It is controlled from the dash and works on the same principle as the roller curtain at home. Installation requires the attachment of two brackets to the car and the fastening of a thong to the under edge of the dash, where it is invisible from the outside. It can be installed completely in an hour or two. Price, \$5.—Sutter-Mayhew Co., 174 Canfield avenue, Detroit.

R. M. S. Shock Absorber

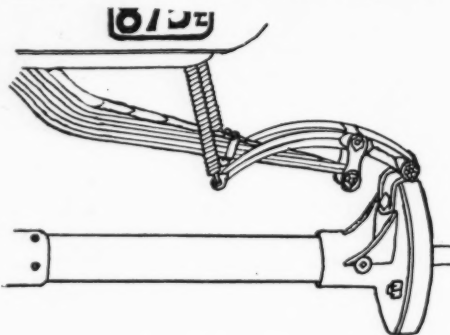
The R. M. S. shock absorber is of the doubler-cantilever type. Each pair of springs is suspended from a balancing saddle which makes the pull on each of the levers equal. Construction is of malleable iron. There is no twisting to the axle or main springs and no interference with either steering or the fender brackets, it is claimed. Price, set of four, \$8.—Right Motor Specialties Co., 1326 Michigan avenue, Chicago.

Automatic Light Controller

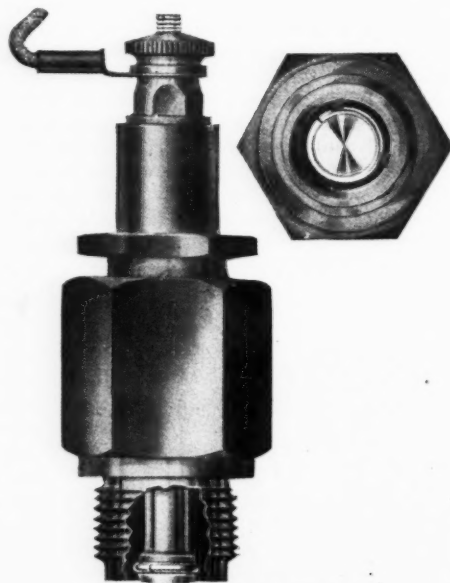
The Barrett automatic light controller for Ford cars is for installation in series with the magneto, with the 18-volt lamps in series replaced by two 9-volt lamps connected in multiple, which are furnished with the controller. The candlepower and voltage of the lights are kept practically constant throughout the range of speed of the car, it is claimed, and a bright, white light is obtained automatically without attention from the operator. The device is attached under the hood over the horn to the two bolt ends which project from the steering column support and coil box. Its winding is connected with the magneto circuit to the lamps, the connections of which are changed. Full directions and wiring diagram are supplied. Price, \$7.—American Sales Corp., 614 Fulton building, Pittsburgh, Pa.

Cradle Tire Carrier

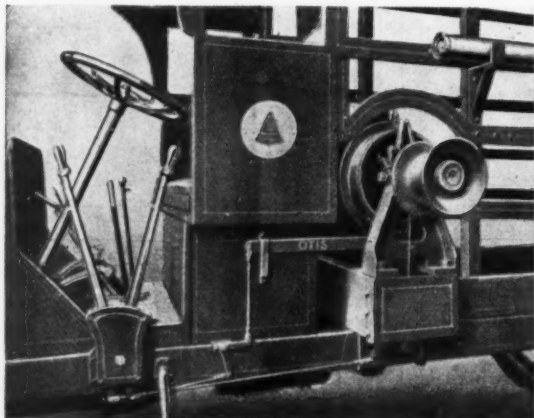
The Humboldt tire carrier is a semi-circular cradle type which will accommodate 3 or 3½-in. tires with or without demountable rims. The cradle is cupped from one-piece sheet steel, forming a smooth receptacle into which the tire fits snugly without chafing the rubber. All component parts are welded electrically, and no rivets



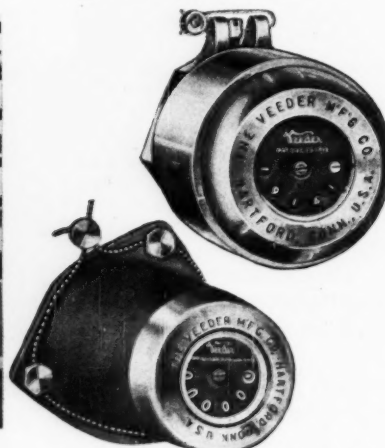
R. M. S. double-cantilever shock absorber



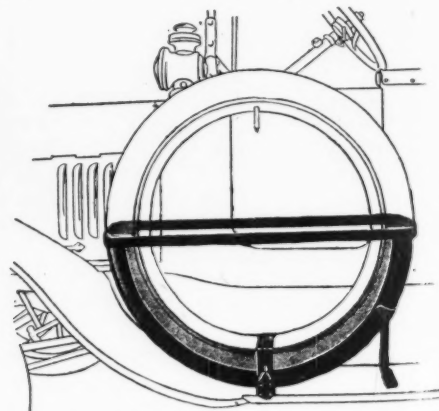
National spark plug, showing firing surface



Otis winch for motor trucks installed



Two types of Veeder hub odometer



Humboldt cradle type tire carrier

are used. A hinged locking device is fitted. Finish is baked ebony enamel. The rear carrier is designed to accommodate license plate and rear lamp and is fastened to the car frame by extra heavy steel brackets. Prices, from \$4.50 to \$8.50.—Humboldt Machine & Stamping Co., Long Island City, N. Y.

Veeder Hub Odometers

The Veeder hub odometer is furnished in two types, the bolted-on and the screwed-on. The device registers the total mileage, whether the car goes backward or forward, and is sealed on the hub so that it cannot be removed without the owner's knowledge. Attachment requires a slot in the end of the spindle. It cannot be removed when sealed without cutting the seal wire, and it can be attached to any wheel having a dead axle.—Veeder Mfg. Co., Hartford, Conn

Benson Signal Speedometer

The Benson signal device incorporates a speedometer, a bumper and a transparent license number, above and below which are two series of holes through which is indicated the speed of the car. A housing of sufficient size to accommodate a license number with margins for the holes is fitted to the front and rear of car. The speed-indicating part of the device fastens to the dash. The lower end of the arrow which indicates the speed travels across electric fields as the speed increases and lights the bulbs back of the holes. When the speed is 5 m.p.h. the light in the upper left hole burns; when it is 10 m.p.h., one beneath burns, and so on. The lights can be arranged to cover a wide range of speeds to conform with statutory limits. An attachment to the bumper closes an electric circuit when pressure is put on the bumper and locks the pointer of the speedometer and the lights indicating the speed at which the car was traveling when the collision occurred. Referring to the illustration, No. 1 comes on first; the one below it, second; No. 2, third; the one below it, fourth; No. 3, fifth; and the one below it, sixth. No. 1 lights are yellow, No. 2 green and No. 3 red.—Motors Appliance Co., East Moline, Ill.

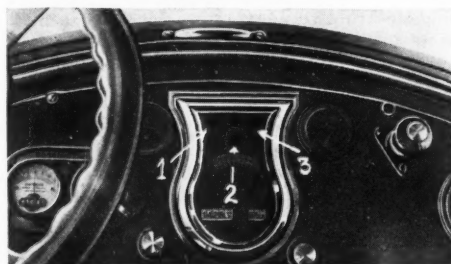
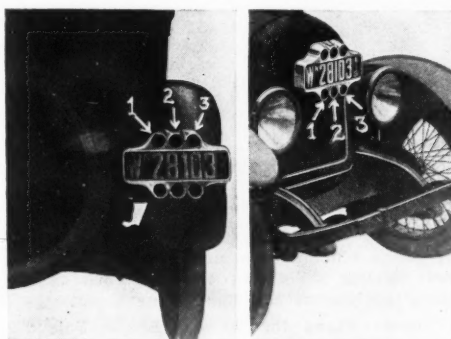
Gidz

Gidz is a fuel for increasing the efficiency of gasoline engines and is for use in motor cars, motorcycles, tractors and stationary engines. It consists of a highly-concentrated form of chemical, which through explosion releases a film-like spray oil which reaches cylinder walls and valve chambers, maintaining uniform lubrication. The chemical is guaranteed to be harmless and to throw off carbon by the process of rapid explosion in the combustion chambers. The fuel comes in tablet form, and in badly carbonized engines two tablets to a gallon are recommended until 100 miles have been covered. Otherwise, 100 tablets treat 100 gal. of gasoline. Prices, \$1 for 100 tablets; \$5 for 600; \$9 for 1200.—Fred M. Giddings, 132 Duffield avenue, Galesburg, Ill.

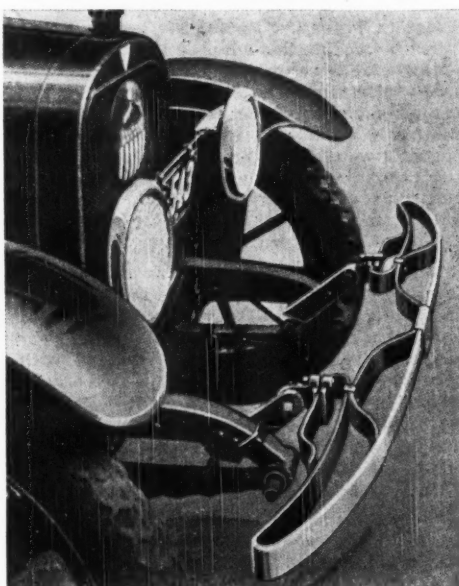
Jewel Battery Gage

Advantage which would be given the user of the motor car if he had at all times

What the Jewel battery gage indicates in keeping the car user aware of the exact state of charge in his battery



Benson signal device, showing its parts



Hercules bumper of spring steel in place



Mayhew radiator curtain adjusted part way

some means of knowing by a glance the exact state of charge of his battery long has been recognized. The specific gravity reading by a hydrometer, of course, gives this, but the motorist is prone to neglect taking readings at frequent intervals, and it usually is a messy job. An instrument to keep the car user constantly informed of the condition of his storage battery is the Jewel battery gage, which consists of a dial with an indicating hand, which points to three divisions of the gage, "Battery full," "Danger" and "Battery empty." The gage is really a voltmeter, which is connected permanently with the battery and is mounted on the dash. The wiring necessitates only connecting the two terminals on the instrument to the two poles of the battery. The current which passes through the instrument is said to be so slight—less than .01 amp., that the storage battery standing idle will discharge through the atmosphere more rapidly than it can through the gage. The dial not only shows the state of the battery but also indicates steps to be taken to get it normal.

From the Four Winds



ADD STUNTS BY MOTOR TRUCKS—Whole forests can be transported by motor truck when necessary, judging from this photograph of a White en route for some place with a migrating monarch

WESTERN Illinois Plans Exhibition—The first annual motor car show of Western Illinois will be held at Quincy, Ill., Feb. 20-24, under the auspices of the dealers. Seventy-one spaces will be available, and all have been taken with the exception of four.

Iowa Cars Gain 100,000—Final figures for 1917 show a total registration of 282,134 motor cars in Iowa. This is a gain of more than 100,000 cars from 1916 and at the rate of one car to eight persons. The amount paid in fees by the owners is \$2,249,655.19.

Even Frozen Alaska Builds Roads—H. L. Gould, of Dawson City, Alaska, recently purchased a car for use in the Yukon district. Road-building around Dawson City soon will make it possible to motor out of the city over a 50-mile stretch of road. The length of the roadway is to be 100 miles within the coming year.

Ohio Considers War Highways—Three state organizations, all having to do with the highway problem in its several phases, combined their activities this year in the Ohio war roads convention in Columbus, Jan. 30 and 31 and Feb. 1. The associations are the Ohio Good Roads Federation, the Ohio Engineering Society and the County Commissioners' Association.

Michigan Wants Roads Kept Open—Highway commissioners of ten Michigan counties, Genesee, Lapeer, St. Clair, Oakland, Washtenaw, Lenawee, Monroe, Millsdale, Wayne and Branch, held a conference recently in Detroit to discuss methods of keeping open roads in these counties. Frank F. Rogers, state highway commissioner, representatives of the motor car industry of the state and a representative of the war preparedness board, also met with them.

Omaha Thefts Include Official Car—So busy and successful have motor car thieves in Omaha become some insurance companies have discontinued altogether the insuring of low-priced motor cars. During 1917 903 cars were stolen, and of these but 650 have been recovered. Omaha's record is excelled only by that of Chicago, Detroit and Denver. The thieves work boldly alike in the dark or at midday. The police commissioner's car was

stolen five times in a single year. A squad of police officers does nothing else but trail car thieves. Yet the thieves work faster than the officers can docket the cases.

Toledo Plans for Annual Show—Toledo's annual show will be held Feb. 11-15 and will include trucks and tractors in the exhibits. Most of the space has been taken. Red roses and laurel constitute features of the decorations. A patriotic scheme of decoration will be carried out.

Omaha Plans "Biggest Ever" Show—Sixty dealers with 100 cars, including a truck and tractor exhibit, will make up the show at Omaha, Neb., Feb. 25-March 2. The demand for space at this, the thirteenth annual, exhibition has resulted in the expansion of the show to two buildings. A covered passageway will connect the two buildings. Particular interest is centered around the exhibit of trucks.

Motors Transport Racing Horses—A Rhode Island horseman has adapted the truck to his racing stable needs, using a Maxwell 1-ton truck to transport his horses and stable equipment from track to track. The first time this outfit was used the truck transported two horses, three men, two sulkies, two trunks and smaller equipment on a circuit that called for trips of 57, 63 and 45 miles. On one trip the truck carried the load 275 miles and return in 15 hr.

Nebraska Claims Broken Iowa Record—Iowa must look to its records, for Nebraska is putting forward its 1917 total of 148,101 motor cars as a claim to more cars per capita than Iowa, which is accredited with one car to every eight persons. Nebraska inhabitants bought approximately 48,000 cars last year, which is more than the entire number of cars owned in the state three years ago and twice the number four years ago.

Manley Truck Gets Free Ride—Recently a 2-ton Manley rolled out of the O'Connell-Manley Truck Co.'s factory just in time to arrive at a railroad spur simultaneously with a switch engine. The locomotive, naturally, having the best of it in weight and in a load of freight cars behind it, picked up the

truck and carried it gratis for about 50 ft. An inventory finding nothing wrong with the truck, it went onto Chicago with no hurt except a bit of marred paint, but the locomotive had to go to the roundhouse for repairs to its coupling gear, step and other parts.

Pennsylvania Farms Own 80,000 Motors—Having acquired nearly 45,000 cars in the last year, the farmers of Pennsylvania apparently are not particular about their horses, and figures made public by the state agricultural department show that there are now 577,877 horses on the farms, compared with 590,087 a year ago. The highway department's figures show that there are 80,000 motor cars on Pennsylvania farms, the figures including trucks and all other cars.

Indianapolis to Have Tractor Day—Tractor day will be a feature of the seventeenth annual motor show to be staged at Indianapolis, Ind., the week of Feb. 25. The Indianapolis Automobile Trade Association is promising the people of Indiana the biggest and best exhibit they have ever had. John B. Orman is show manager. The show will be held in the new building of the Diamond Chain & Mfg. Co., a four-story structure affording nearly 82,000 sq. ft. of floor space for exhibit purposes.

York Show Is Canceled—Owing to the coal shortage, the annual show at York, Pa., was called off. The arrangements for the exhibition were progressing nicely and practically all the available floor space had been sold when the county fuel administrator informed the York Automobile Dealers' Association that the show must not take place at this time owing to the scarcity of coal. The outlook was for one of the most successful shows in the history of the association. Approximately fifty different makes of cars were listed. There is a probability that the show will be held the last week in February.

Delaware May Have State-Long Roads—Delaware's chief engineer has recommended the construction of a double road running the entire length of the state, from north to south, the two sections to start near the eastern and western boundaries, where the state joins Maryland on the south, and coming together at several points, all centering at Wilmington, from which a radial system is proposed. Expense has been simplified by the offer of General T. Coleman du Pont to build one of these state-long roads and present it to the state, which will mean an outlay of between \$2,000,000 and \$3,000,000. The recommendation has been submitted to the state highway commission and a program based on it is expected soon.

Courses in Farm Motors Popular—More than half the students entering the second semester at the University of Nebraska school of agriculture are registering for the special course in farm motors, which includes instruction in tractors, trucks, shop work and the like. Twenty tractors and trucks have been purchased by the university as the nucleus for equipment to be used in instruction and in providing the students with practical experience. To the great shortage of help on the farms of Nebraska and the middle West, and the consequent growing importance of the use of tractors and trucks on these farms, is attributed largely the popularity of the farm motors course. Not only this, however, but also the demand for truck and tractor experts in military service, to which many of the students are liable, is recognized as a strong factor.

Among the Makers and Dealers

EMPIRE Tire to Double Capacity—The Empire Tire & Rubber Co., Trenton, N. J., is expanding its plant and will double its capacity.

Kershaw Works Manager for Standard—George D. Kershaw has been appointed general works manager for the Standard Aero-plane Corp. of New Jersey, Elizabeth, N. J.

Rumney Gets Commission in Army—Mason P. Rumney, formerly sales manager of the Detroit Steel Products Co., has been appointed a lieutenant in the Ordnance Department.

Sioux City Tire to Expand—The Sioux City Tire & Mfg. Co. is planning to practically double its capacity within the next few months. The plant has been in operation only three months and is turning out between sixty and 100 tires a day.

Fletcher Opens Detroit Branch Office—The L. V. Fletcher & Co., New York manufacturers of carbureters, has opened a branch office at Detroit, with George K. Parsons in charge. Frank M. Eldredge, formerly of the Wallace C. Hood Service Bureau, is advertising and publicity manager.

Former Dealer Is Redden G. M.—Samuel S. Toback, formerly the largest distributor of Hudson cars in the country, has been elected general manager of the Redden Motor Truck Co. Mr. Toback's territory as distributor was New York and environs. He also distributed the King and Daniels.

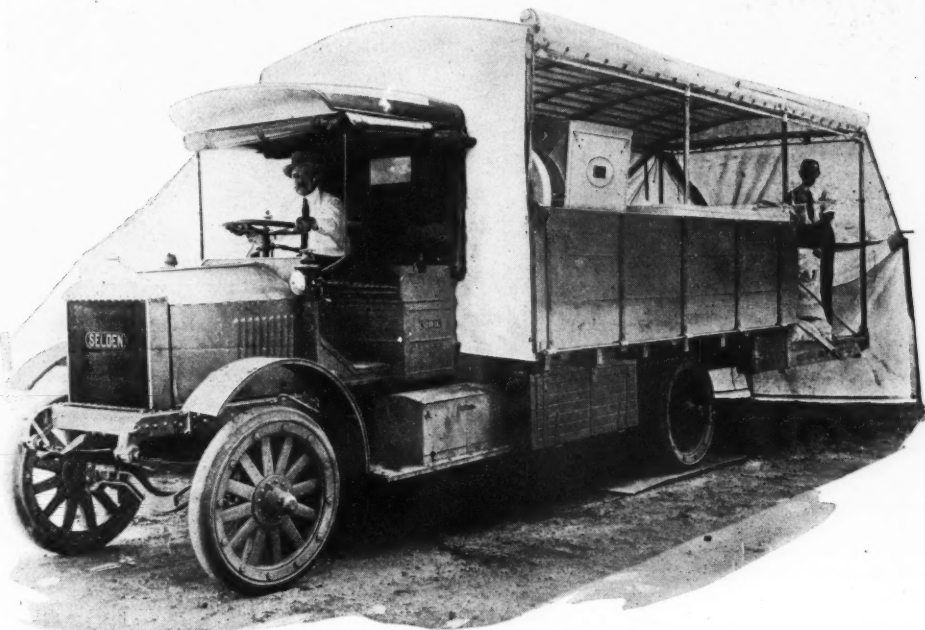
Olympian Motors Co. Elects—The following officers were elected for the Olympian Motors Co. at the annual meeting of stockholders: President, Fred K. Parke; vice-president and treasurer, William Passmore; secretary, C. E. Callender; production manager, L. P. Helm; director of sales and advertising, St. Clair Couzens.

Hayes Heads Jackson Munitions Co.—Clarence B. Hayes of the Hayes Wheel Co. has been elected president of the Jackson Munitions Co. A strong directorate has been brought together, including O. W. Mott, C. C. Bloomfield, Dean Kimball, B. M. Delameter, M. S. Potter, Edward Frensdorf, Watson R. Smith, John W. Miner and A. G. McBurney. The company is capitalized for \$500,000.

Topp-Stewart Buy Water Sites—The Topp-Stewart Tractor Co., Clintonville, Wis., which is ready to undertake the regular production of farm and general utility tractors in its new plant, has purchased two water power sites on the Embarrass river, near Clintonville, and will erect a hydro-electric plant developing about 800 hp. The installation will provide electric power for the Topp-Stewart plant and the surplus will be purchased by other Clintonville industries.

Tire Fabric Routed by Trucks—The Joseph Bancroft & Sons Co., Wilmington, Del., who furnishes material for balloons and tire fabric required by manufacturers at Akron, Ohio, and other western cities, because of the railroad congestion is making deliveries by truck. The trucks are operated day and night. Sleeping quarters are provided and as there are two men with each truck, one operates it while the other sleeps. The same trucks call at Boston, Providence, New York, Philadelphia and other eastern cities.

Willard Battery Makes Branch Changes—H. S. Gardner, formerly district manager of the Chicago branch of the Willard Storage Battery Co., has resigned to manage the Midwest Storage Battery Co. at Kansas City, Mo. Charles E. Frizell, formerly district manager of the branch at Cleveland, Ohio, will succeed Mr. Gardner at Chicago, and



BREAD BY MOTOR FOR SOLDIERS—The ingenuity and skill called forth by the war in the utilization of motors is demonstrated by this Selden 3 1/2-ton truck with army bread-making machine

I. A. Kuhn, formerly assistant district manager at the New York branch, will succeed Mr. Frizell at Cleveland.

Pioch Chief Engineer of Fruehauf—C. E. Pioch, formerly with the Packard Motor Car Co., has been appointed chief engineer of the Fruehauf Trailer Co.

Murfey Joins Essenkay Company—W. A. Murfey, formerly general sales manager of the Hurley Machine Co., has been appointed director of sales for the Essenkay Products Co., manufacturer of Essenkay tire filler.

Hosler Buys Overland Agency—E. G. Hosler, formerly district manager of the Mid-Western Division of the Willys-Overland Co., has purchased the Overland-Houston Co., Houston, Tex., and is acting as president and general manager.

Ford Factory Profit-Sharing Banquet—The annual profit-sharing banquet of the Ford Motor Co. was held recently to commemorate the beginning of the profit-sharing and welfare system. About 300 were present, including Henry Ford, F. L. Klingensmith and executives, superintendents and foremen.

Western Machine Is Organized—The Western Machine Products Co. has been incorporated for \$100,000 at Cleveland, Ohio, and takes over the land and building of the Marvel Accessories Mfg. Co. In addition to the regular line of the old company, a special line of products will be manufactured. L. A. Katz is president.

Locomotive Has 336 Men in Service—The Locomobile Co. of America has 336 names on its honor roll now. This is about 17 per cent of its force. Of these two are majors, three captains, fourteen lieutenants and three ensigns. Among the men recently with the Locomobile who have gone into service are a lieutenant colonel and a major.

Champion Increases Its Motor Fleet—The Champion Spark Plug Co., Toledo, Ohio, in an effort to minimize the problem of transportation, is adding to its fleet of motor cars. Twelve new cars have been ordered for use by members of its sales and advertising staffs, increasing the number to twenty-

three. These cars distribute advertising material among dealers in this country and Canada. A salesman and a window decorator accompany each car and install displays in various cities.

Simplex Rubber Into New Plant—The Simplex Rubber Co. is now in its new plant at Batavia, N. Y., and production is under way. Branches are being opened in most of the largest cities.

Gray in Aviation Reserve Corps—Samuel W. Gray, for the last year and a half engineer with Reed & Glaser, consulting engineers at Indianapolis, Ind., has joined the Aviation Reserve Corps as first lieutenant and has reported to Washington for service.

French Gets Commission in the Army—Lucius French, advertising manager of the National Motor Car & Vehicle Corp., has been appointed a first lieutenant in the motor section of the Ordnance Department. This makes the 112th star in the National service flag.

Four Drive Tractor to Expand—The Four Drive Tractor Co., Big Rapids, Mich., will enlarge its plant to double the capacity. The following officers have been elected: President, Jotham Allen; vice-president and sales manager, J. C. Jenkins; treasurer, Albin Johnson; secretary and manager, H. E. Frederick.

Jones Concentrates on Wholesale Business—Through the auction of a \$60,000 stock of motor car tires and accessories and the letting of a local sales contract for the distribution of its products, the Jones Motor Car Co., Wichita, Kan., passes entirely out of the retail business. The general purchasing offices, formerly located at Detroit, have been consolidated with the Wichita branch, and all offices of the company are now in the executive building at the Jones factory.

Wisconsin Motor Completes Addition—With the increase in its capital stock to \$1,000,000 the Wisconsin Motor Mfg. Co., Milwaukee, Wis., announces the completion of an addition to the plant used mainly for the assembly of engines. The addition in-



AT HOME IN SNOW AND BATTLE—This Holt caterpillar tractor is doing a bit at helping clear the streets of snow

cludes a sub-assembly and final assembly department in addition to shipping department and stock room. The total floor space is 43,520 sq. ft. The old assembly department has been converted into a machine shop. With the brass foundry recently erected, the new addition quadruples the capacity of the plant.

Mason Helps Relieve Traffic—To help relieve the freight congestion the Mason Tire & Rubber Co. has established a truck service between Kent, Ohio, where the factory is located, and its distributor at Pittsburgh, Pa. Tires regularly are forwarded by truck to that point.

Case T. M. Managers Meet—Thirty-one managers and their assistants attended the sixteenth annual branch managers' meeting of the J. I. Case T. M. Co. at Racine, Wis. Branches in both the United States and Canada were represented, and E. J. Gittins, vice-president in charge of sales, directed the meetings.

Ackerman to Gotham Studebaker Branch—Charles A. Ackerman, for the last three years used car manager of the New York branch of the Studebaker Corp. of America, has been appointed sales manager for the Franklin Motor Car Co. of New York, Franklin distributor. He will have supervision over both new and used car sales departments.

Garage Man Now Truck Major—E. K. Jones, Danville, Ill., for several years manager of the Jones garage in that city, has just been commissioned major at Fort Sill, Oklahoma. He will be in command of the eighth division supply train, which consists of six motor truck companies, composed of 198 trucks, seven touring cars and five motorcycles.

Reiss to Distribute Carlisle Tire—Charles E. Reiss, New York, Hupmobile distributor, has become wholesale distributor for the Carlisle Cord Tire Co. and will trade as the Carlisle Cord Tire Sales Co. The new company, which is not incorporated, will function as the wholesale distributor for the Carlisle company in a large part of the eastern territory, including New York and parts of Pennsylvania, New Jersey and Connecticut. The acquisition of the tire business will not in any way interfere with Reiss' Hupmobile interests or business.

Thirty-Eight Trucks Delivered Overland—The Garford Motor Truck Co., Lima, Ohio, is making an overland delivery of thirty-eight trucks of capacities varying from 1½ to 7 tons. While it is in no sense a test run, the weather encountered has practically made it that. Snowdrifts from 6 to 12 ft. deep and from ¾ to a mile in length have been reported. The trip will supply various Gar-

ford branches between the plant and New York. The itinerary includes Findlay, Fremont, Oberlin, Cleveland, Warren, Beaver Falls, Pittsburgh, Philadelphia and New York.

Knowles to Hale & Kilborn—W. H. Knowles has resigned as chief engineer of the Saxon Motor Co. to accept a position as superintendent of the Hale & Kilborn Co.'s plant at Philadelphia, Pa.

Bell Buys Buildings of Pullman—The Bell Motor Car Co. has purchased the buildings formerly occupied by the Pullman Motor Car Co. and vacated when the firm went into the hands of receivers more than six months ago. James Adair, Lancaster, president, and Dr. B. Frank Posey, York, secretary-treas-

Coming Motor Events

SHOWS

- Feb. 2-9—Minneapolis, Minn.
- Feb. 5-9—Binghamton, N. Y.
- Feb. 7-13—Portland, Ore.
- Feb. 11-16—Kansas City, Mo.
- Feb. 18-23—St. Louis, Mo.
- Feb. 11-17—Toledo, Ohio.
- Feb. 16-24—San Francisco, Cal.
- Feb. 18-23—Syracuse, N. Y.
- Feb. 18-23—Grand Rapids, Mich.
- Feb. 18-23—Springfield, Ohio.
- Feb. 18-23—Des Moines, Iowa.
- Feb. 18-23—Duluth, Minn.
- Feb. 18-23—Nashville, Tenn.
- Feb. 18-25—Pittsfield, Mass.
- Feb. 18-27—South Bethlehem, Pa.
- Feb. 20-24—Quincy, Ill.
- Feb. 20-23—Des Moines, Iowa.
- Feb. 23-March 2—Duluth, Minn.
- Feb. 25-March 2—Salt Lake City, Utah.
- Feb. 25-March 2—Muskegon, Mich.
- Feb. 25-March 2—Indianapolis, Ind.
- Feb. 26-March 2—Omaha, Neb.
- Feb. 27-March 2—Columbus, Ohio.
- Feb. 27-28—Burlington, Iowa.
- March 2-9—Boston, Mass.
- March 6-9—Clinton, Iowa.
- March 6-9—St. Joseph, Mo.
- March 6-9—Sioux Falls, S. D.
- March 16-20—Great Falls, Mont.
- March 20-23—Trenton, N. J.
- March 20-23—Holdrege, Neb.
- April 9-13—Stockton, Cal.

urer of the Bell company, were the purchasers, the consideration being \$40,000.

Chase Resigns from King—T. P. Chase has resigned as chief engineer of the King Motor Car Co., to take effect Feb. 1.

Welch Resigns from King Sales—C. J. Welch has resigned as vice-president and sales manager of the King Motor Sales Co., his resignation taking effect Feb. 1.

Stewart with Economy Motor Co.—Y. E. Stewart has been appointed sales manager of the Economy Motor Co., Tiffin, Ohio. Mr. Stewart has been connected with Cleveland manufacturers heretofore.

Blaine Resigns from Packard—W. E. Blaine has resigned as truck engineer of Packard and is now captain in the Officers' Reserve Corps, Ordnance Department, stationed at Washington.

No-Chain to Make Truxton Truck—The No-Chain Truck Unit Co., St. Louis, Mo., will begin the manufacture of the Truxton truck on a large scale at once. The company has been manufacturing the No-Chain truck unit only.

Dugan and Delling Join Stanley—J. F. Dugan has been made production manager of the Stanley Motor Carriage Co., Newton, Mass., and E. H. Delling, designer of the Mercer, has joined the engineering department.

Benner to Manage Franklin Factory—R. E. Benner has been made factory manager of the Franklin Automobile Co., Syracuse, N. Y. Mr. Benner was at one time with the Maxwell company as a car designer and afterward with the Buick company.

Dorris Buys Mogul Truck Plant—The Dorris Motor Car Co., St. Louis, Mo., has acquired the plant of the Mogul Motor Truck Co., which adjoins the Dorris plant. A receivership recently was asked for the Mogul company. The Dorris company also has acquired as a building site a lot adjoining the plant, 200 by 177, and plans are being made for the extension of the factory on this site.

Forge Products Erecting Plant—The Forge Products Corp., Ann Arbor, Mich., has been incorporated with a capitalization of \$350,000 to manufacture high-speed steel forgings for tool work and motor car parts. Work on the first building, which will be 50 by 100 ft., will be started at once. All the necessary machinery has been purchased and will be ready for installation upon completion of the first building. The company expects to be in production in about ninety days.

Traffic Truck Acquires Factory—The Traffic Motor Truck Corp., St. Louis, Mo., has acquired a building for factory purposes. The building contains 45,000 sq. ft. of working space. T. C. Brandle, Westcott and Chevrolet distributor, is president of the company and H. P. Mammen is general manager. The material is engaged for 2500 trucks this year. They will make only a 2-ton truck, which will sell for about \$1,000. The general offices will be removed to the factory building.

Goodyear Tire Entertains Its Soldiers—The men who have joined the training camps from Akron, Ohio, are mostly at Camp Sherman, Ohio, and Camp Sheridan, Ala. More than 2000 of them are from the Goodyear Tire & Rubber Co., so the Goodyear Friars appropriately visited each camp. The Friars is a troupe of amateur and former professional performers, all employees of the company, whose efforts are chiefly minstrel. They have just returned from a 1700-mile jump to Camp Sheridan, where they entertained Governor Charles Henderson at the executive office as well as entertaining the boys in camp. C. W. Sieberling, vice-president, went with the Friars on the trip.